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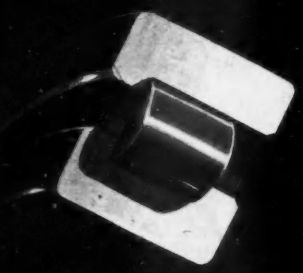
MATERIALS · PROCESSES · PRODUCTION · MANAGEMENT

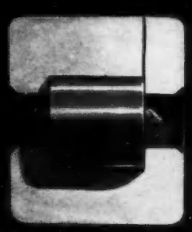
Monthly: Two Shillings and Sixpence ESTABLISHED 1875 AUGUST 1958

677k-2

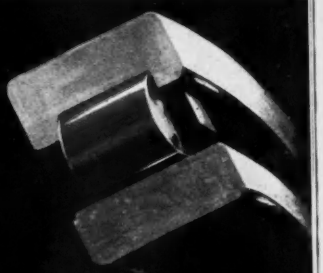
Two Lips



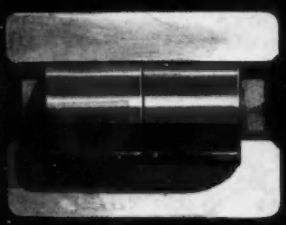
Three Lips



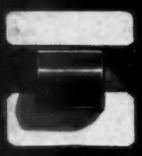
Three Lips
Loose Side Plate



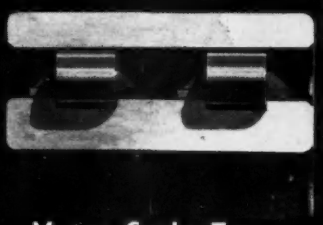
Two Lips



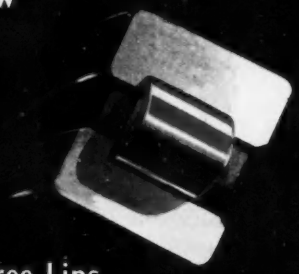
Double Row



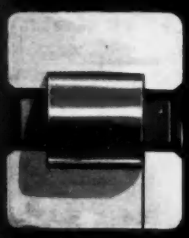
Extra Light



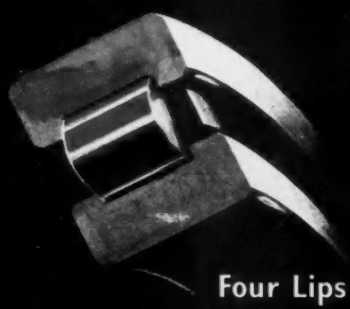
Motor Cycle Type



Three Lips



Three Lips Loose Side Plate



Four Lips

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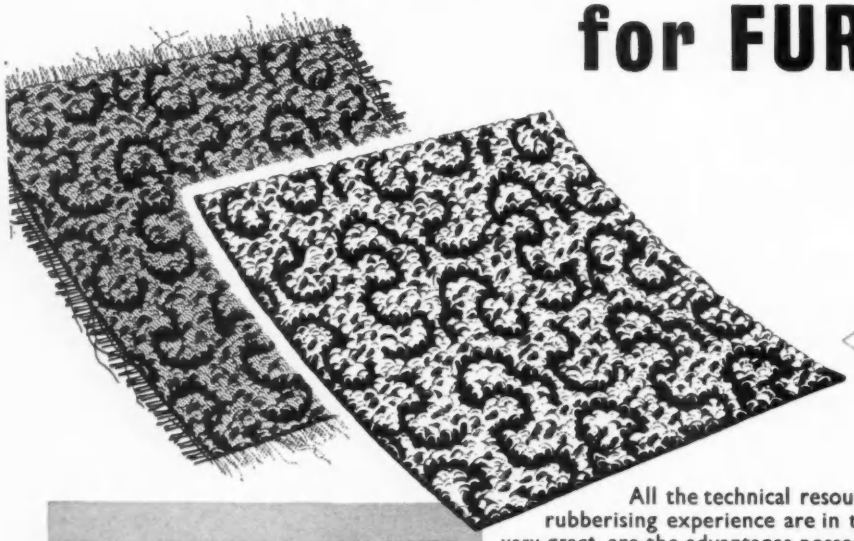

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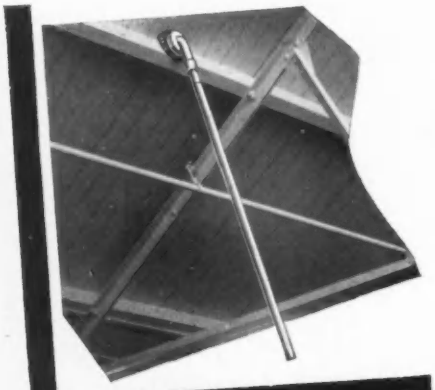

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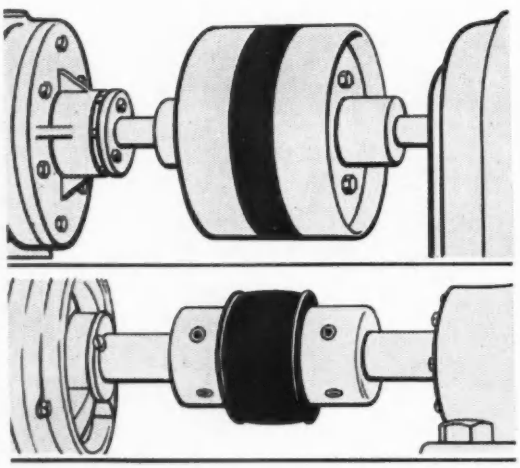

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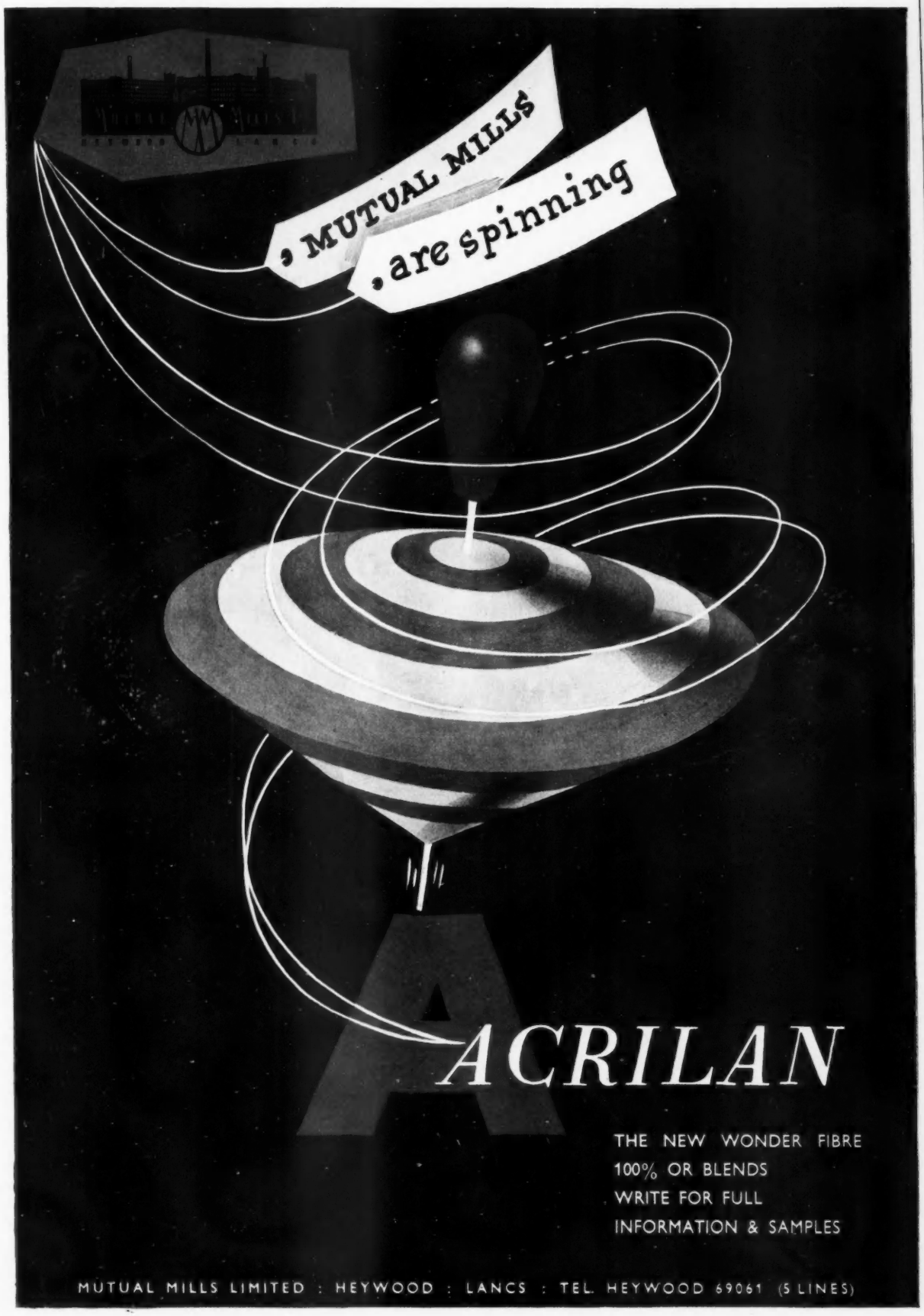
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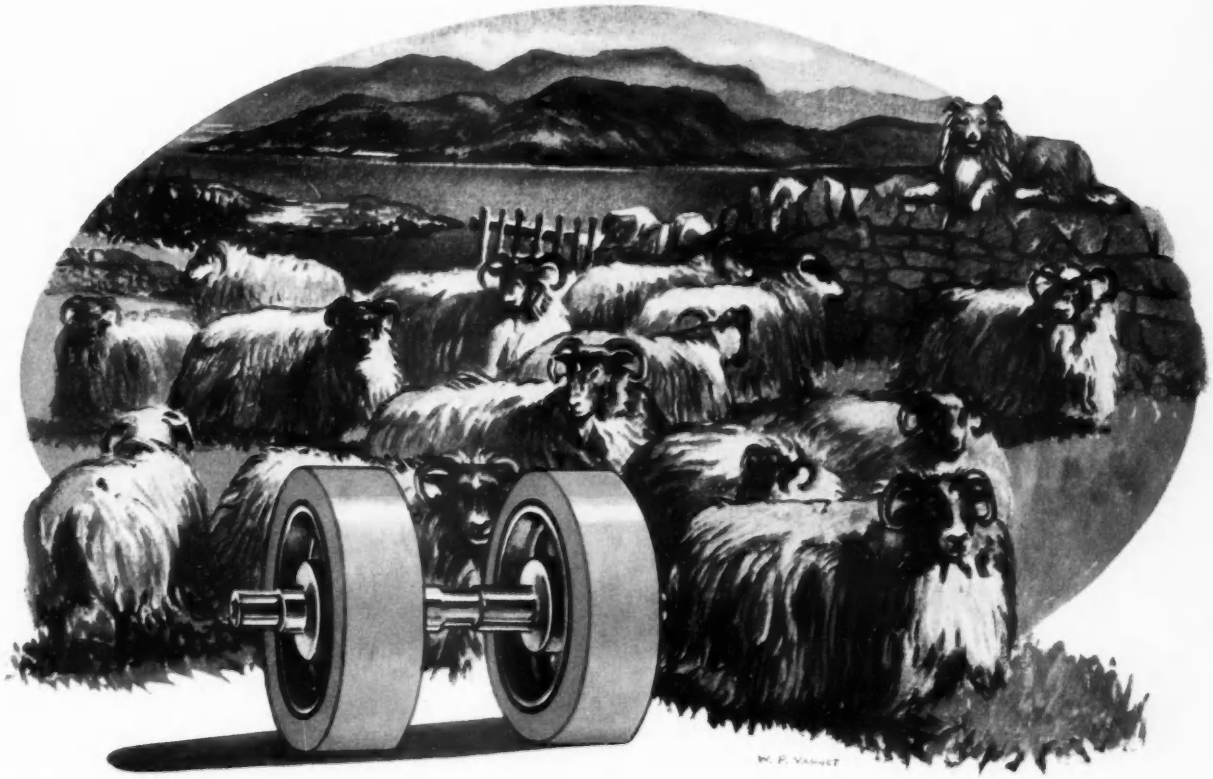

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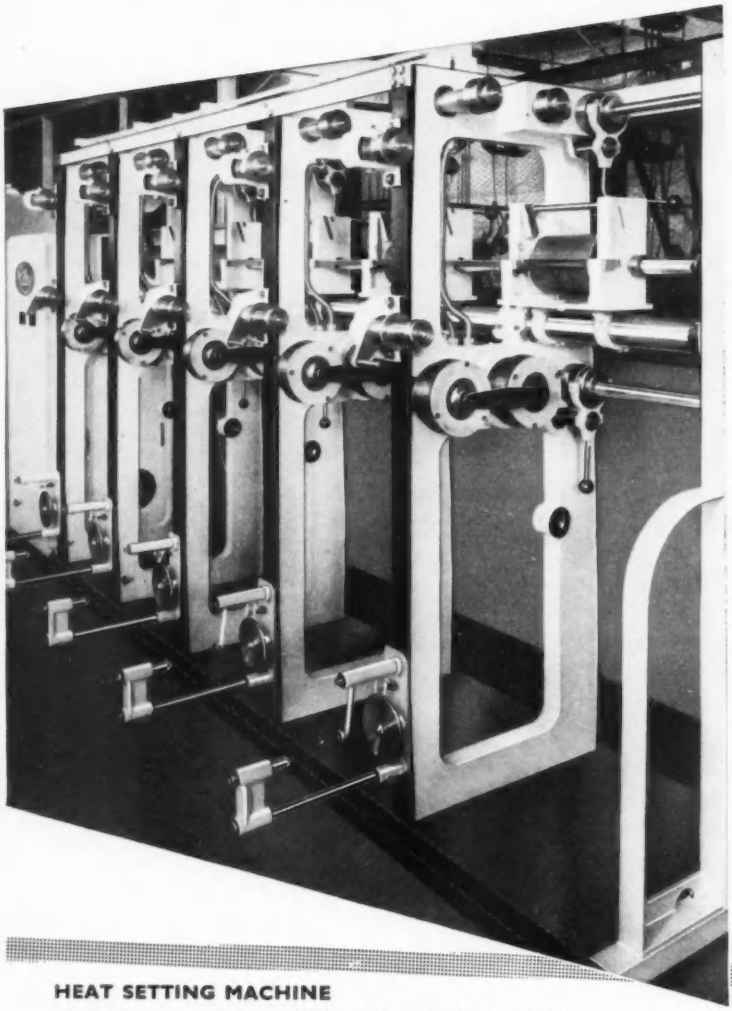
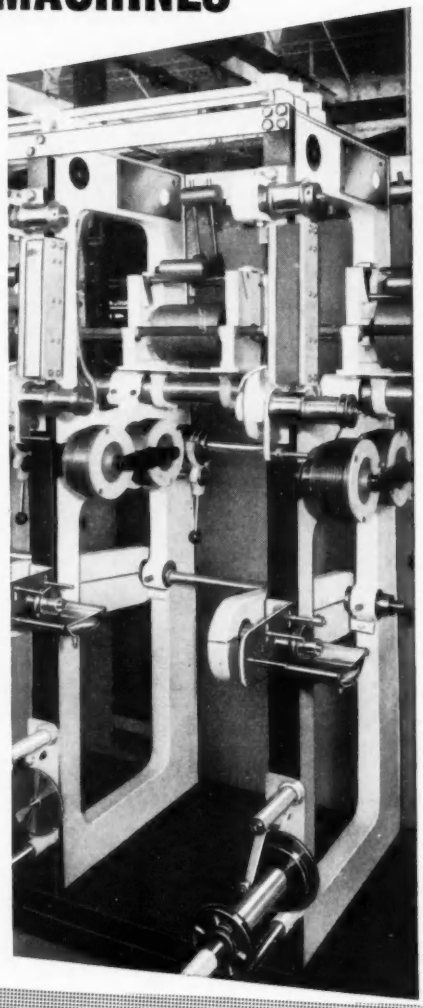
HEAT SETTING & DIPPING MACHINES





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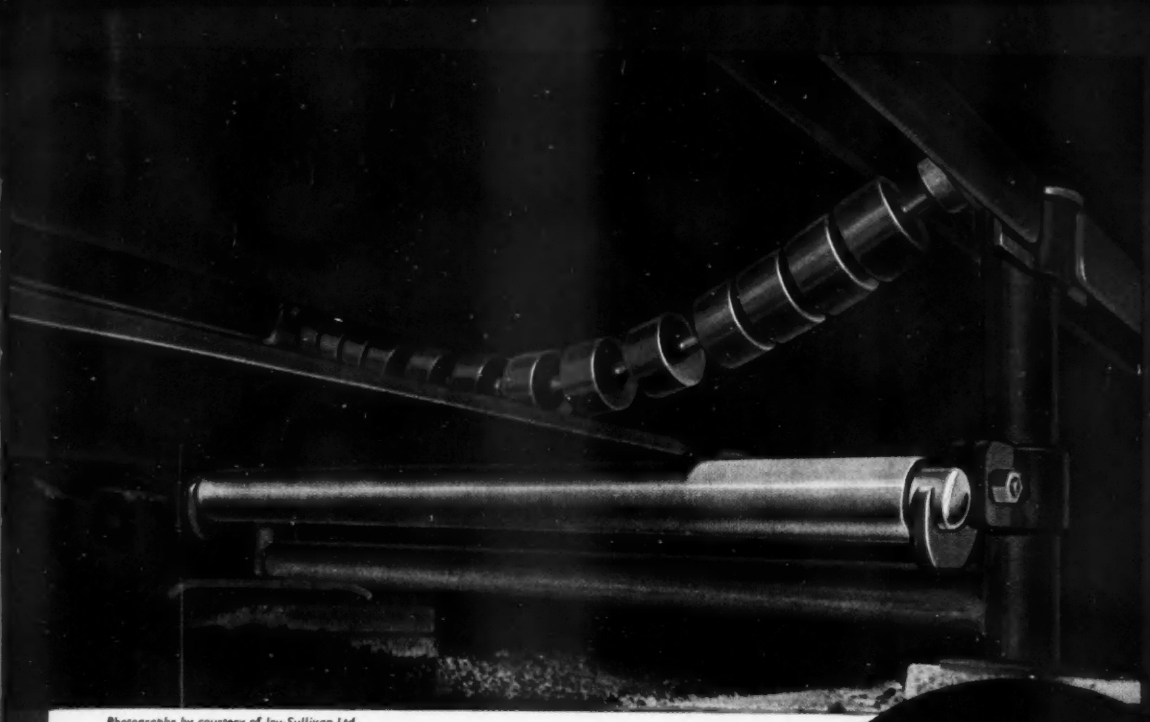
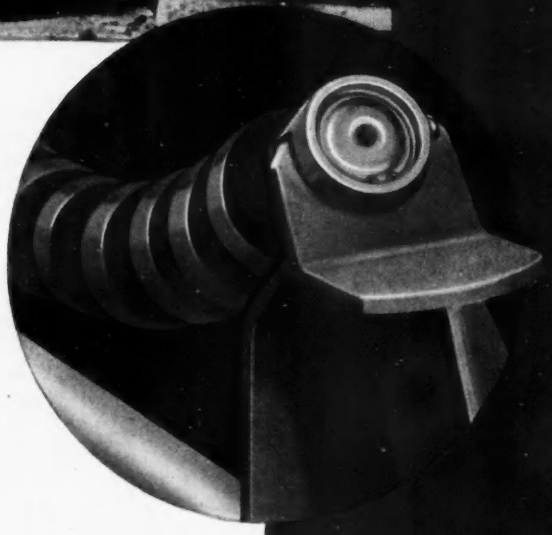


Photographs by courtesy of Joy-Sullivan Ltd.

What an FBC sealed bearing can withstand



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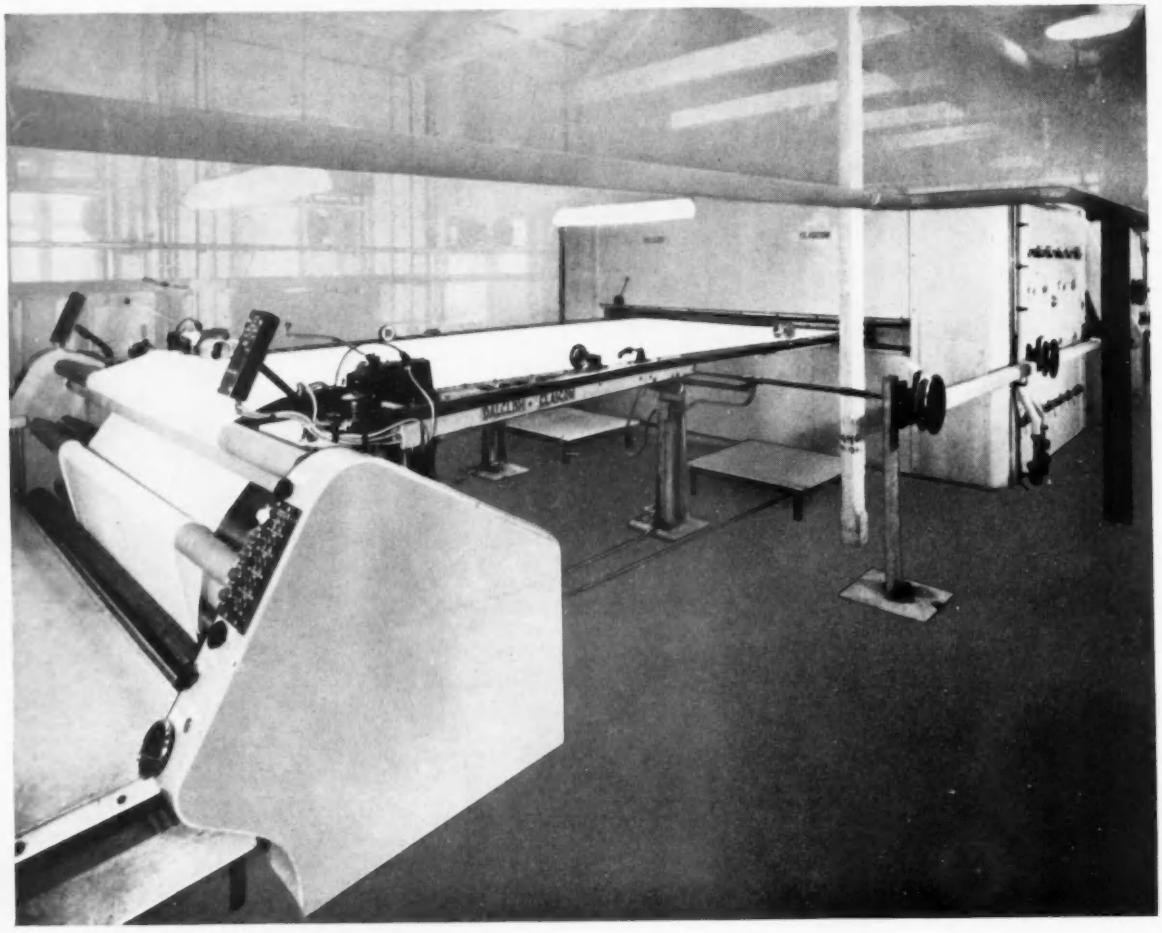

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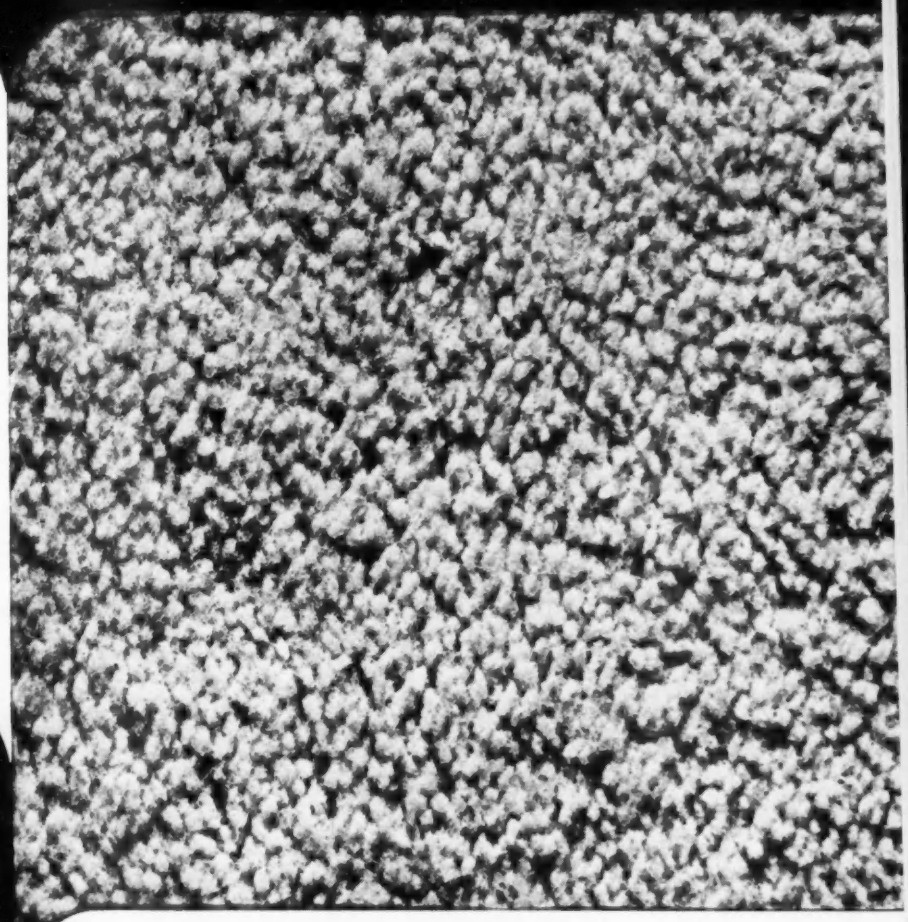

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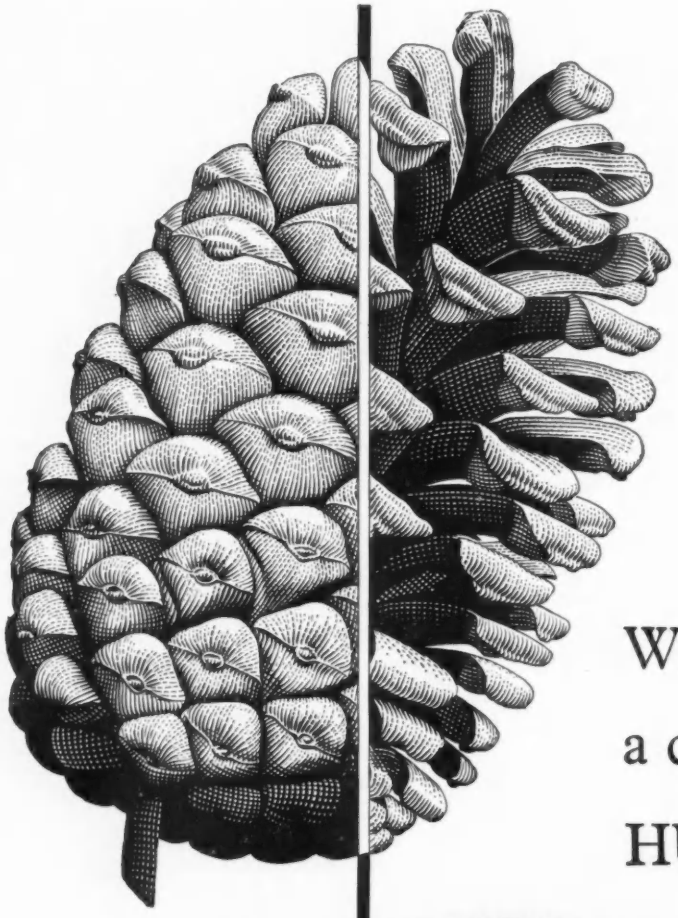

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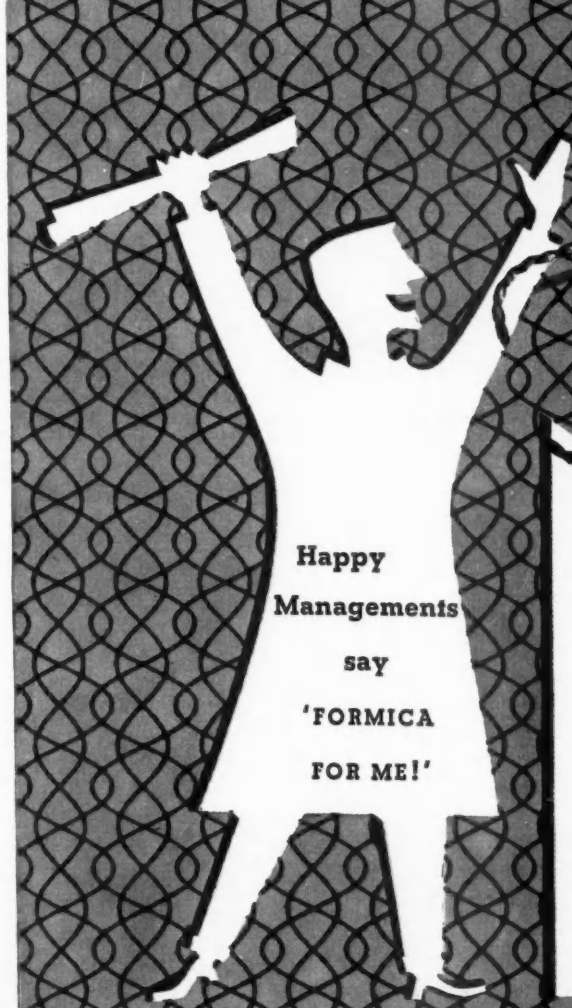

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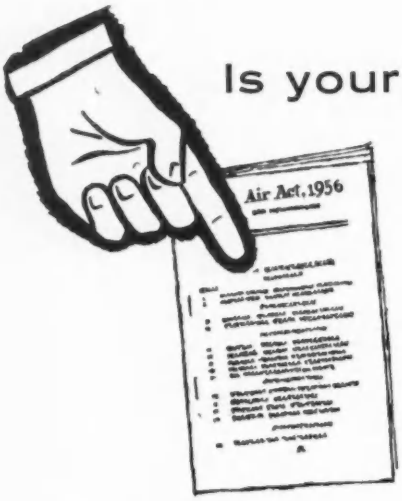

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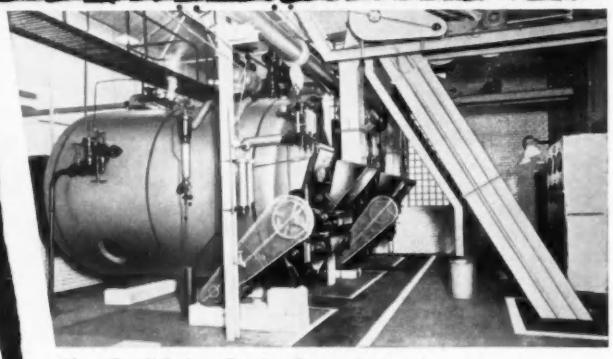

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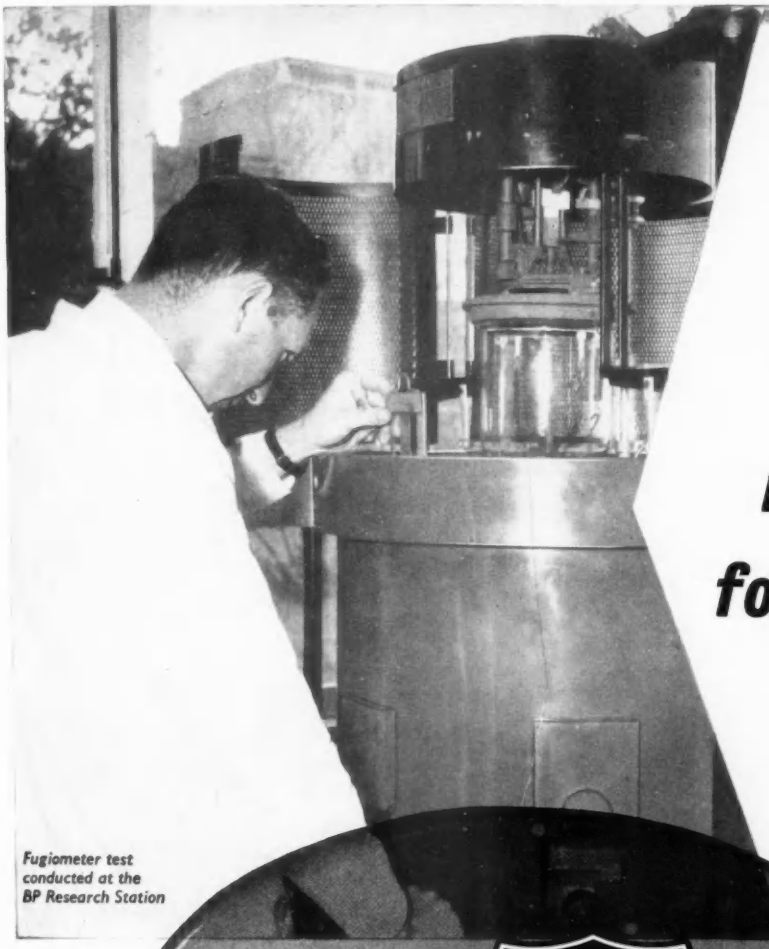

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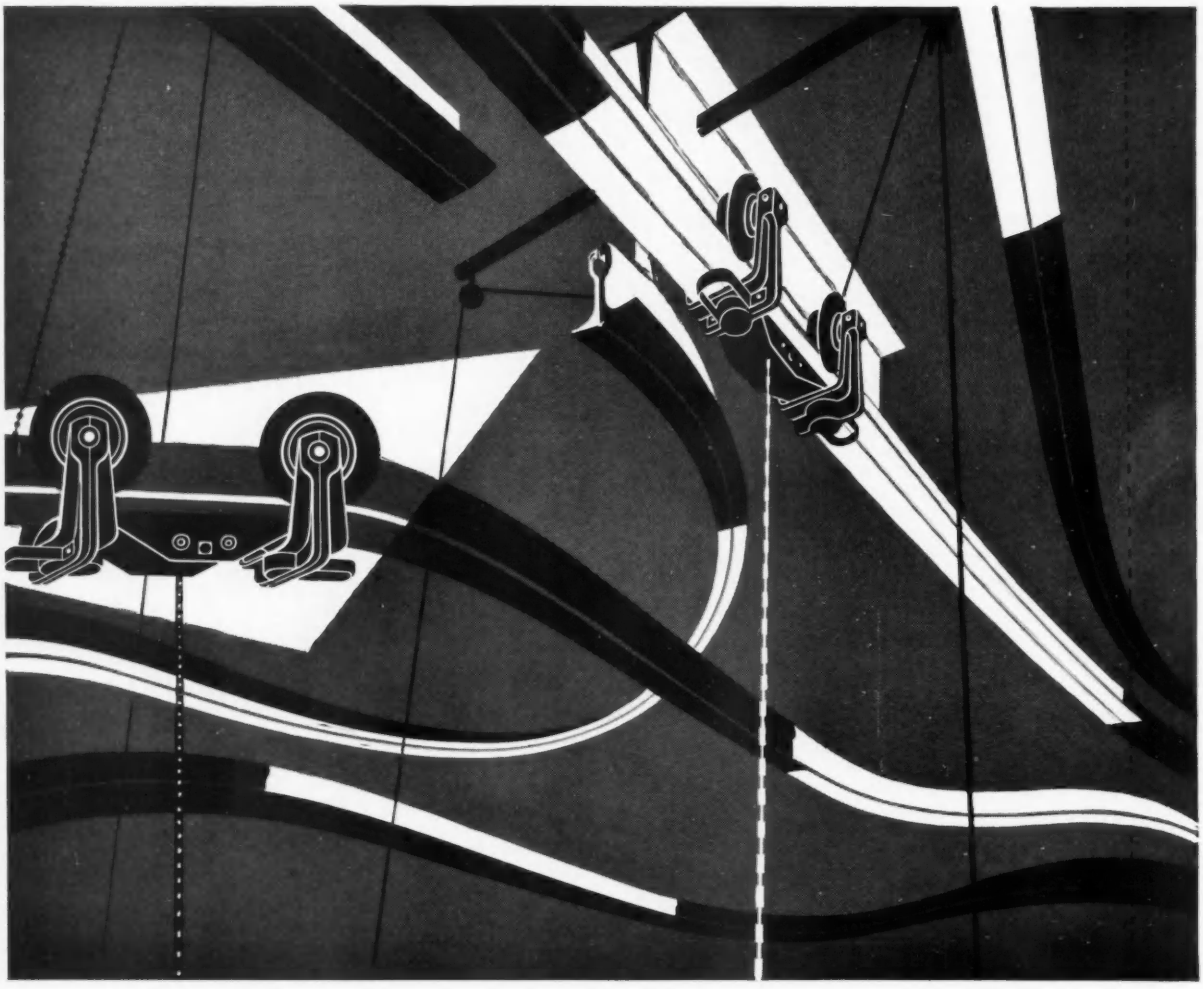
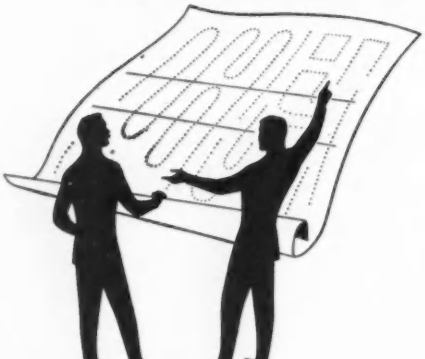


OVERHEAD is the open road



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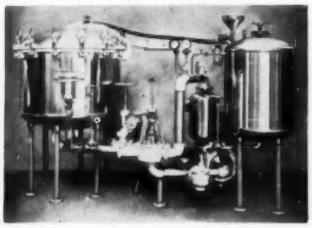
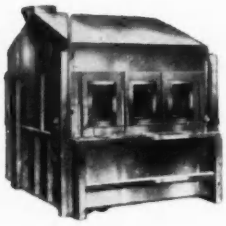


PRESSURE DYEING MACHINES

A complete range of machines for dyeing all types of fibre in every stage of manufacture including loose, top, beam, hank and package forms. Also rapid package drying machines.

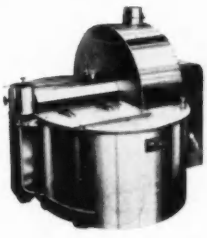


FABRIC AND PIECE GOODS

Machines available in several capacities for dyeing knitted fabrics, silk or rayon and woollen or worsted piece goods in rope form.

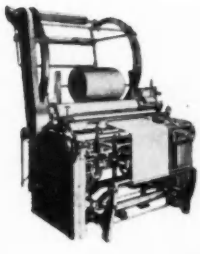
ROTARY DYEING MACHINES

Totally enclosed rotating drum machine for dyeing nylon, pure silk, rayon and cotton hose with perfect penetration and uniformity. Stainless steel in 25, 50, 100, and 200 lbs. capacities.



PADDLE DYEING MACHINES

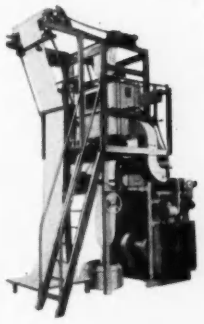
A versatile machine in stainless steel for ladies' hose, half-hose and loose articles. Also used for anti-shrink and bleaching. 4 capacities from 12-200 lbs



CALENDERS

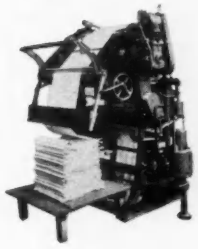
Medium type in 2 sizes with single or twin feed for finished fabric widths up to 59". Light type and continuous blanket heavy type Calenders are also available.

PEGG



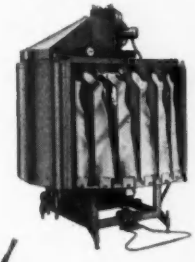
FABRIC DRYING MACHINES

The Pegg-Pasold machine for continuous drying of all circular and warp knitted fabrics in a relaxed condition.



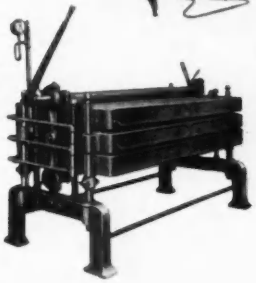
FABRIC FINISHING MACHINES

The Bromac machine imparts a luxury finish to knitted fabrics. Automatic for finished widths up to 33".



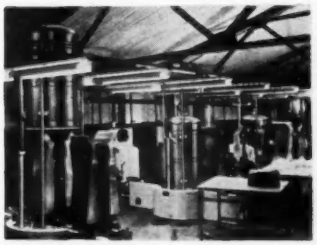
HOSE FINISHING MACHINES

Forms move through circular drying chamber at low temperature to ensure perfect matt finish, to nylon hose.



PRESSES

3 and 2 bed presses for finishing all classes of hose, half-hose and similar articles.



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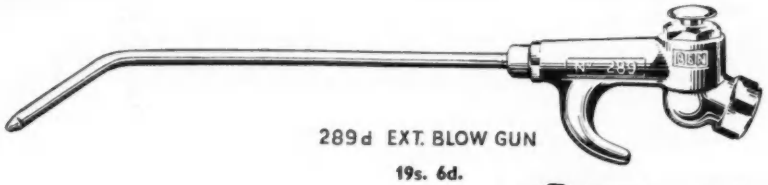

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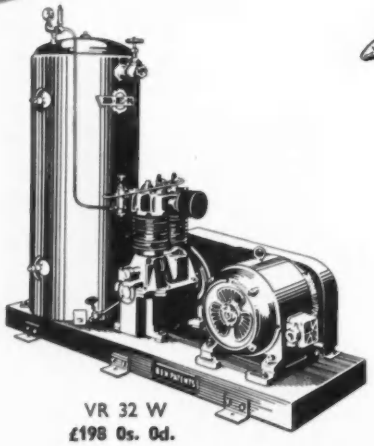

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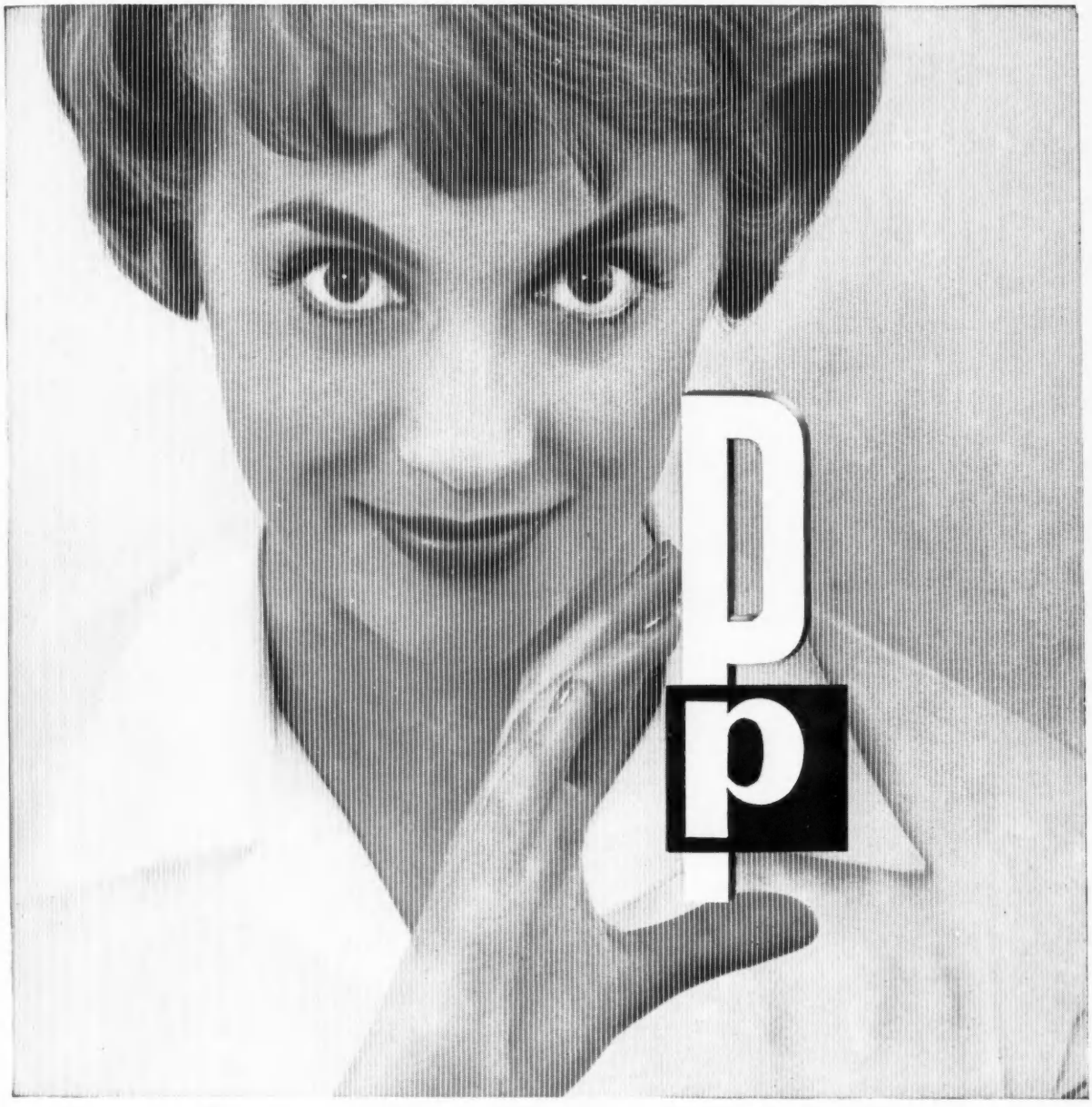

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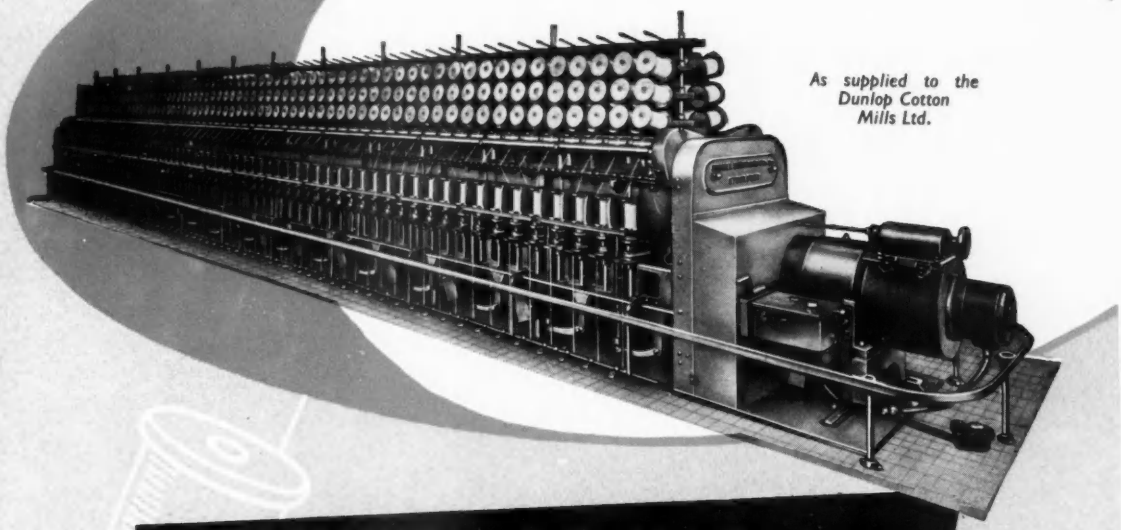

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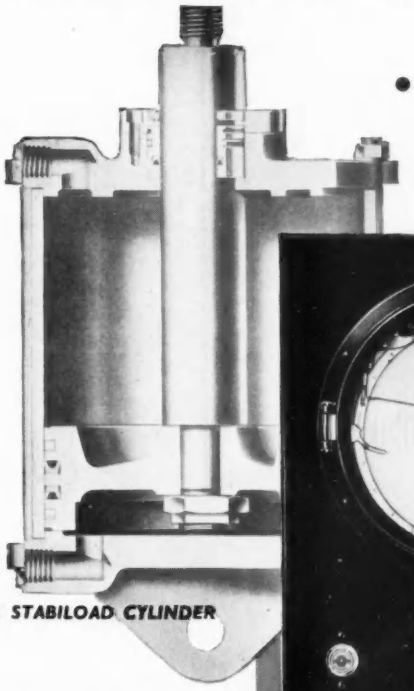

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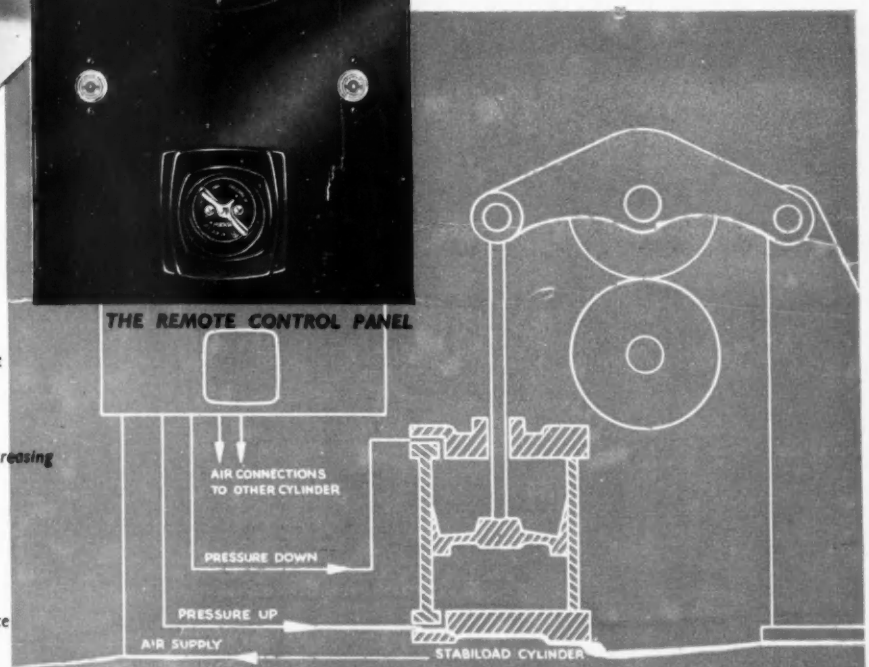

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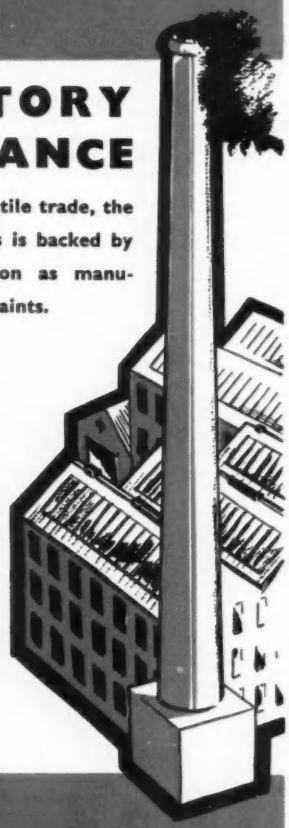

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* *Photo shows a modern Jute Spinning Flat in a Dundee Mill, where TICO coverings have been installed.*

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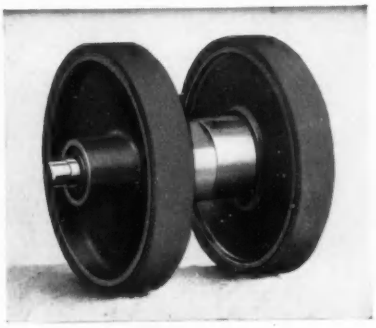

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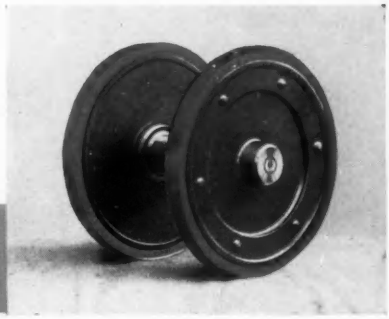

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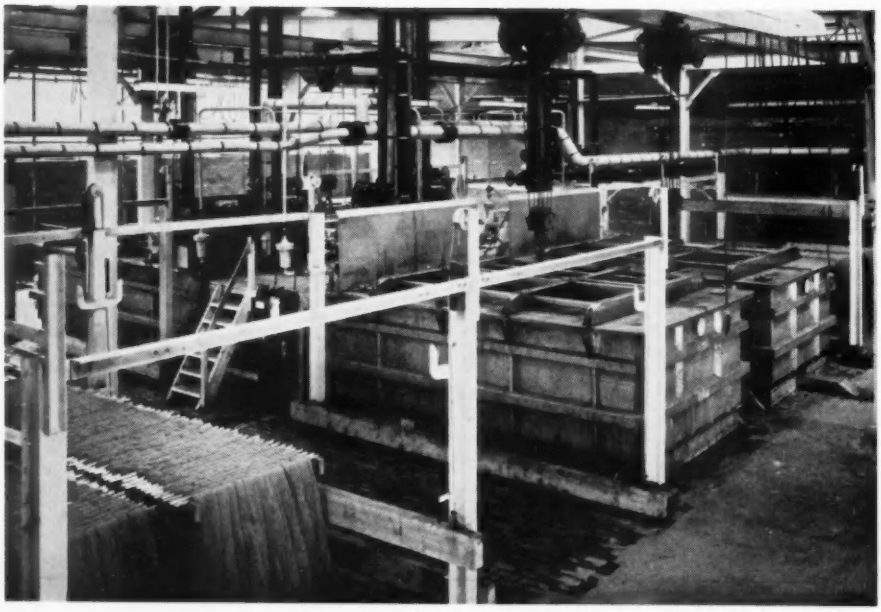

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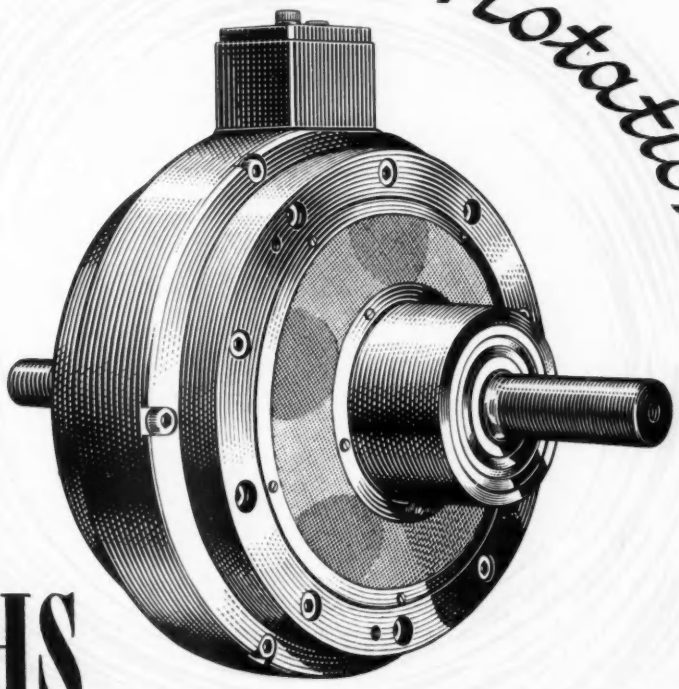

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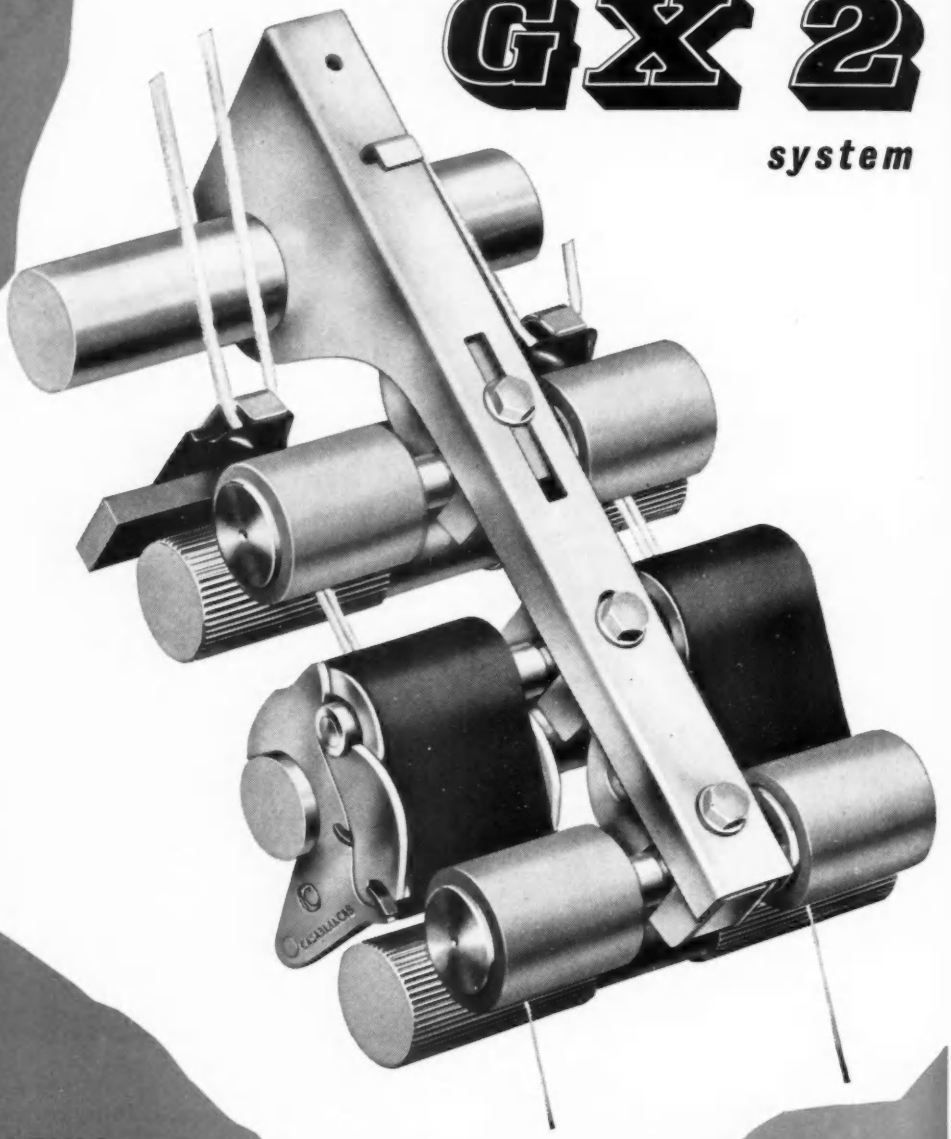

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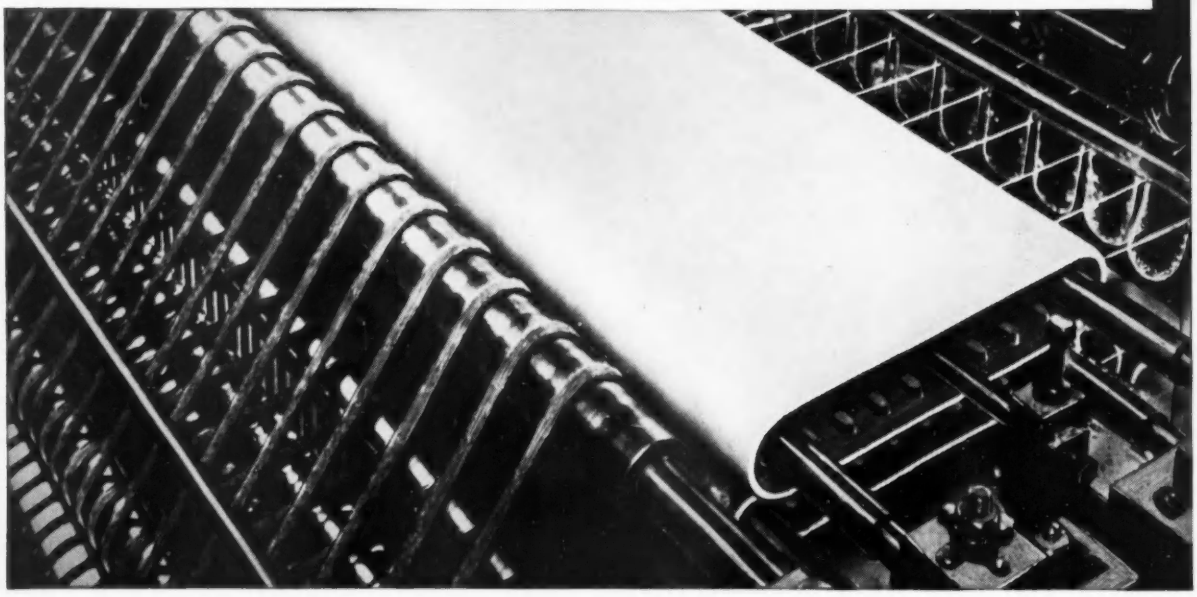

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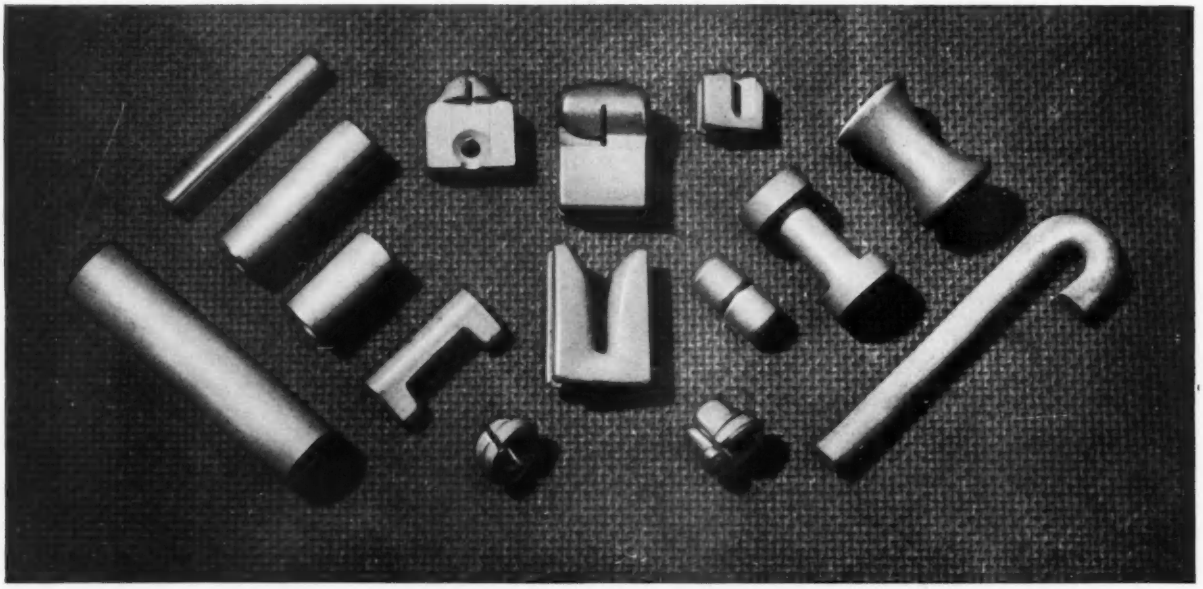

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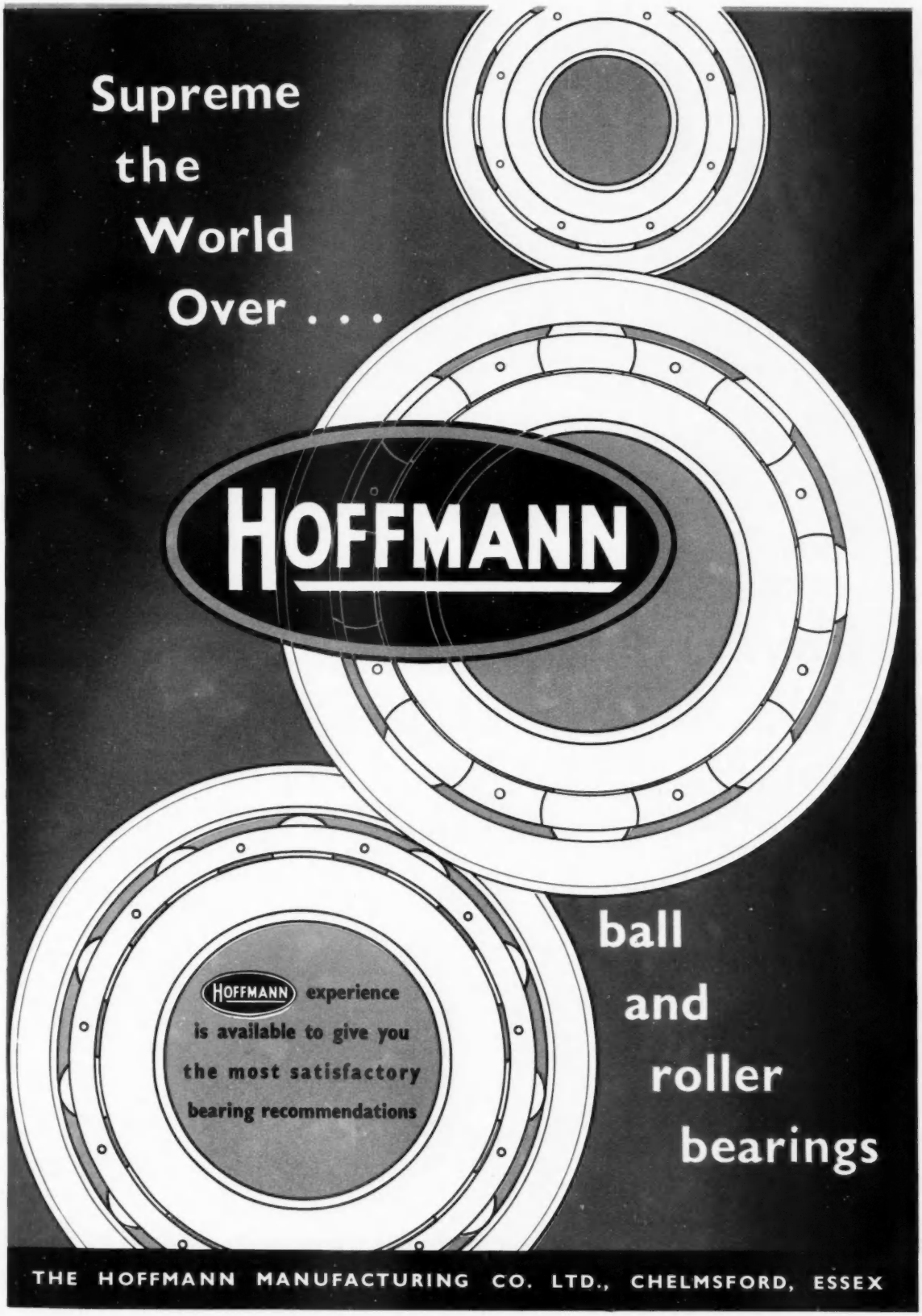
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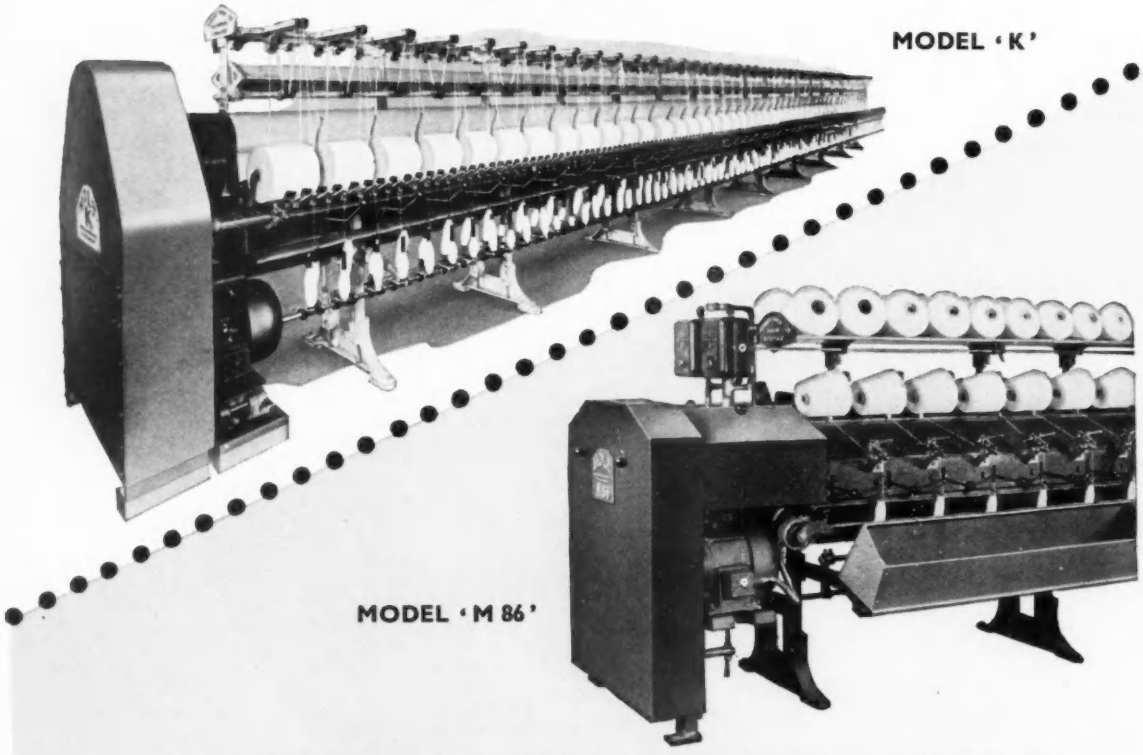

These two Holt machines embody those refinements in design which have made high speed, versatility and absolute uniformity outstanding characteristics of all Holt machines throughout a century of service to the Textile Industry the world over.

Illustrated above (left) is the Model " K " Cheese Winder which can be employed as a single or multiple end winder for the production of cheeses or cones, achieving perfect winding of packages up to 8" diameter at 5" and 6" traverse and up to 10" diameter at 8" traverse.

The Model " M 86 " High Speed Cone or Cheese Winder shown above (right) is outstanding in the consistency and uniform tension of the packages produced for Knitting and Warp Yarns. Silent in operation, the " M 86 " deals alike with all spun yarns in any count or quality. This adaptability is due to the independent reciprocating traverse motion from which a wide range of traverse to winding ratios is obtained without risk of pattern winding.

We shall gladly send illustrated leaflets fully describing these and other machines in the complete Holt range, and demonstrations may be arranged by appointment.

HOLT

HIGH SPEED PRECISION
TEXTILE MACHINERY

THOMAS HOLT LIMITED *Rochdale & Darwen*

dm HT 60

As Simple to OPERATE as a PLAIN LOOM

Hattersley STANDARD BLANKET LOOM

1. Fully automatic with up to 4 colours of weft.
2. Low Build enhances appearance of weaving shed and ensures clean cloth.
3. Large capacity pirns reduce waste factor.
4. Automatic lag saving device.
5. Automatic Pick Finder increases loom efficiency.
6. Weft trailing-in eliminated by shuttle eye weft cutter and consecutive pick temple cutter.
7. Twin Micro-setting weft forks.
8. Available in four reedspaces 90″, 100″, 110″ and 120″.
9. Maximum Flange Diameter on Weaver's Beam: 30″.
10. Can be seen weaving in our Show Room.

We are exhibiting at the "Textile Recorder" International Textile Machinery and Accessories Exhibition. Stand Number 1602

MADE BY

Hattersley

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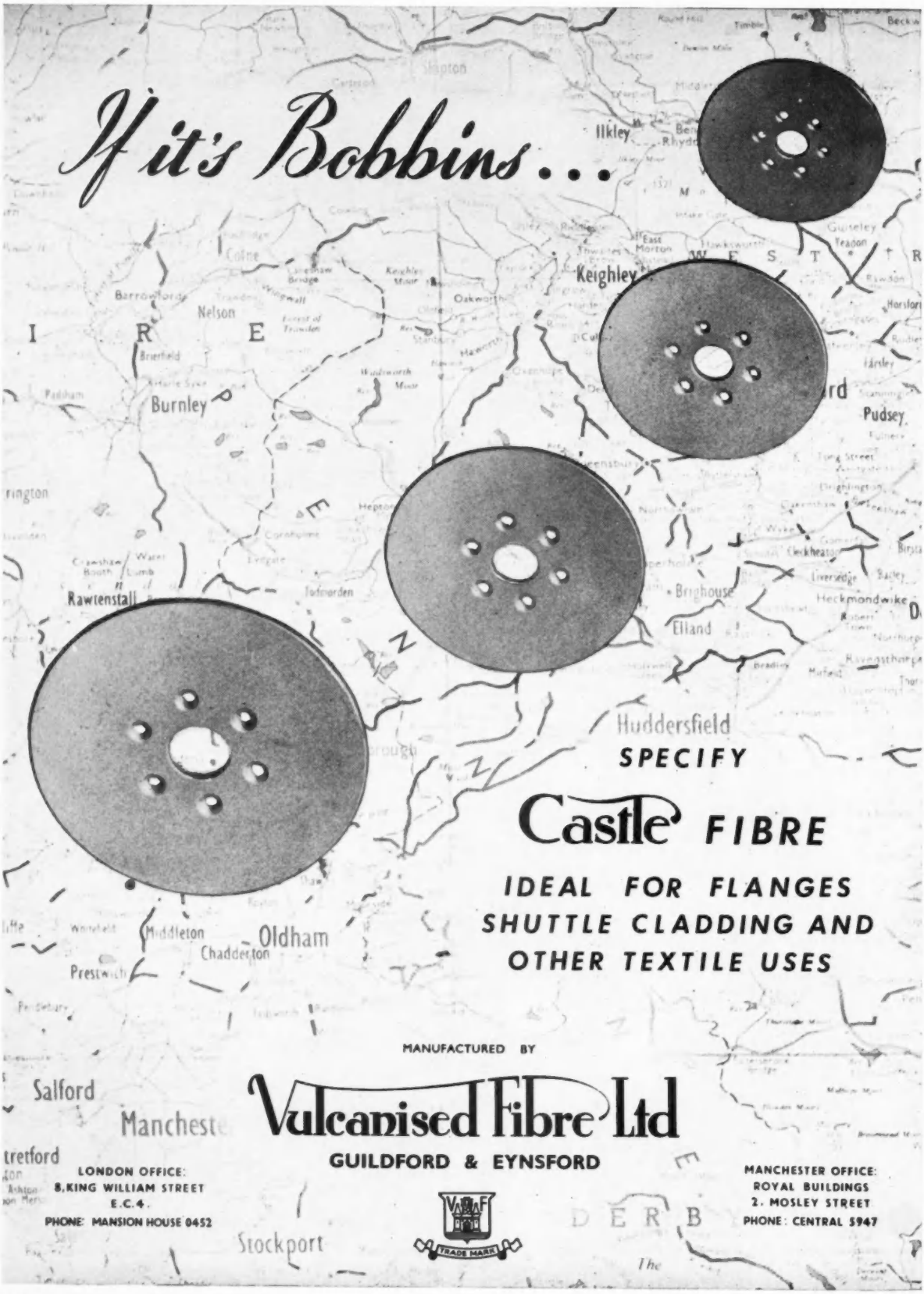

MANUFACTURERS OF 'CASTLE' VULCANISED FIBRE, SHEETS, RODS, TUBES, LEATHEROID, CONTAINERS AND COMPONENT PARTS

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And so it is with springs.
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But it has taken nearly two centuries of skill and devotion to achieve so great a reputation for reliability that—ironically enough—the greatest compliment paid to Salter Springs is that you can forget them!

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WEST BROMWICH, ENGLAND.
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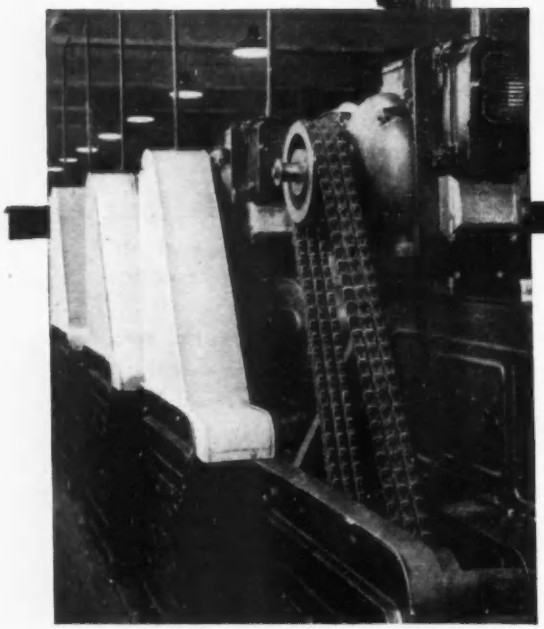
THE LINK V-BELT THAT SOLVES YOUR PROBLEMS AND SAVES YOUR MONEY...



Three "C" section Dixlink belts transmitting 10 h.p. on a ring spinning frame at 1440 r.p.m., in a Blackburn Mill.

Dixlink is manufactured in sizes covering the rubber vee rope range with 40° angle sections. Also supplied in 28° angle sizes. Manufactured to Dick standards of quality—which are *the* criterion in the trade—Dixlink can be installed and running in a matter of minutes. Dismantling costs and production hold-ups are eliminated and the problems of fixed centres and structural restrictions are removed. Dixlink saves space by ending the need to carry large stocks and the costs of storage and depreciation are reduced. Four coils of 50 ft. each in the M, A, B and C profiles can provide replacements for the entire range of standard vee belts in these sections.

Also available in "double vee" sections. Dixlink can be supplied in oil and heat resisting qualities. Dixlink is undoubtedly the cost-saving answer to your vee belt problems. A technical brochure, covering applications and horse power ratings, will be sent on request.

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Glasgow, London, Bristol, Birmingham, Manchester, Leeds, Newcastle, Dundee, Belfast, Dublin, Amsterdam and Vienna. Agencies throughout the world. American factory at Passaic, New Jersey.

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USTER

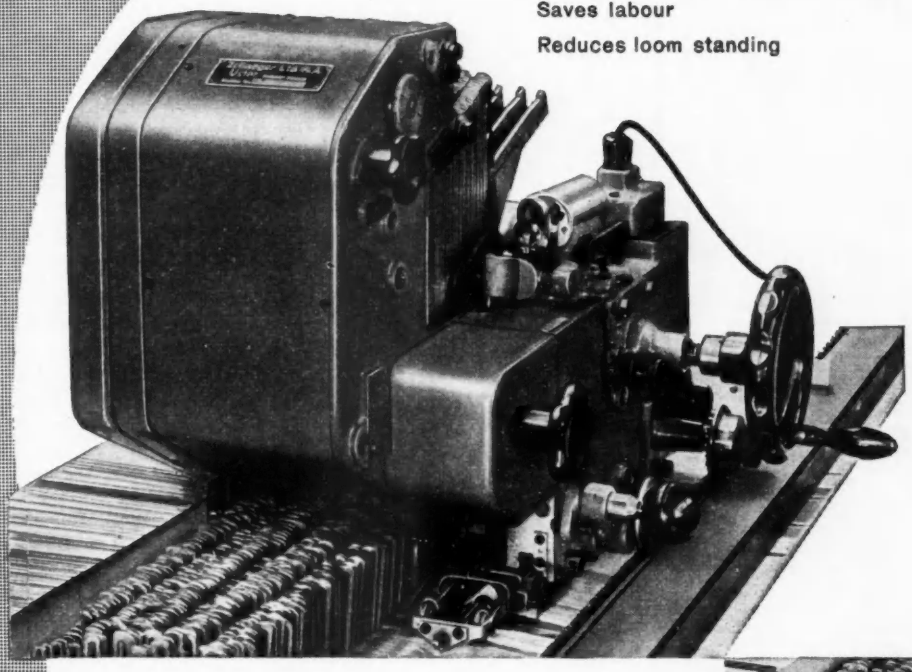
"Uster" Dropper Pinning Machine Reduces Loom Standing Time

Pins up to 300 open ended droppers per minute

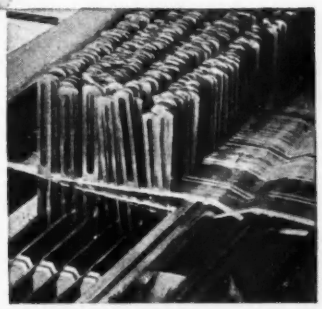
Suitable for pinning at the Loom, or as a stationary unit away from the loom

Saves labour

Reduces loom standing



The droppers are carried in a magazine with a capacity of up to 6,000 droppers, replenishable without stopping the machine. An efficient and experienced staff is maintained in this country for erection, tuition and repairs. A comprehensive Spare Parts Service is at your disposal.



Zellweger Ltd. Uster Factories for Apparatus and Machines **Uster** (Zurich) Switzerland

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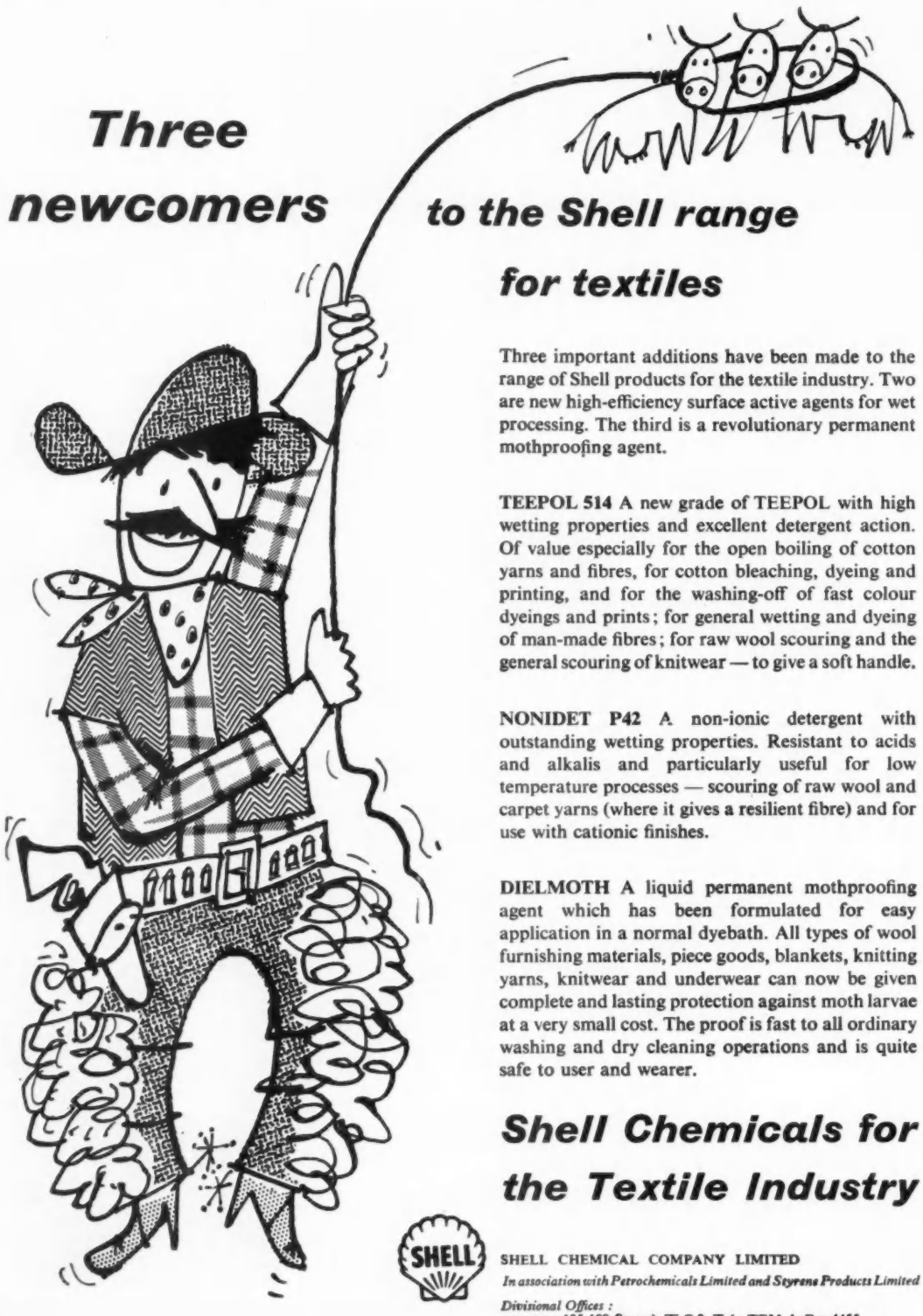
Three newcomers to the Shell range for textiles



Three important additions have been made to the range of Shell products for the textile industry. Two are new high-efficiency surface active agents for wet processing. The third is a revolutionary permanent mothproofing agent.

TEEPOL 514 A new grade of TEEPOL with high wetting properties and excellent detergent action. Of value especially for the open boiling of cotton yarns and fibres, for cotton bleaching, dyeing and printing, and for the washing-off of fast colour dyeings and prints; for general wetting and dyeing of man-made fibres; for raw wool scouring and the general scouring of knitwear — to give a soft handle.

NONIDET P42 A non-ionic detergent with outstanding wetting properties. Resistant to acids and alkalis and particularly useful for low temperature processes — scouring of raw wool and carpet yarns (where it gives a resilient fibre) and for use with cationic finishes.

DIELMOTH A liquid permanent mothproofing agent which has been formulated for easy application in a normal dyebath. All types of wool furnishing materials, piece goods, blankets, knitting yarns, knitwear and underwear can now be given complete and lasting protection against moth larvae at a very small cost. The proof is fast to all ordinary washing and dry cleaning operations and is quite safe to user and wearer.

Shell Chemicals for the Textile Industry

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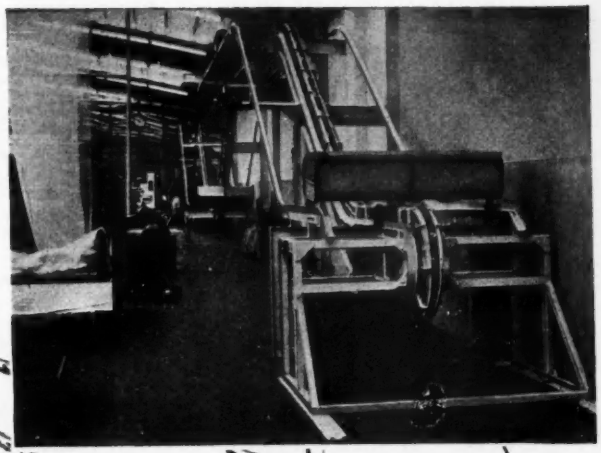
TXI

TEEPOL, NONIDET and DIELMOTH are registered trade marks.

Teleflex conveyor system installed at Hollands-Zwitersche Borduurfabriek Egger N.V. Almelo. The system comprises a Universal Overhead Conveyor for the transport of cotton goods with automatic discharge.



A comparison between old and new methods. Installation by Teleflex N.V., Rotterdam.

We have the pattern for Handling at our fingertips—

The textile industry is another instance of where Teleflex handling systems are speeding production and reducing costs. Teleflex Mechanical Handling Engineers are called upon to provide many different handling systems — in their hands the problems of improved flow pattern and reduced handling costs find their ideal solution.

Please send for literature — or better still, tell us about your needs, our interest will be sincere and our recommendations frank.

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masters of mechanical handling

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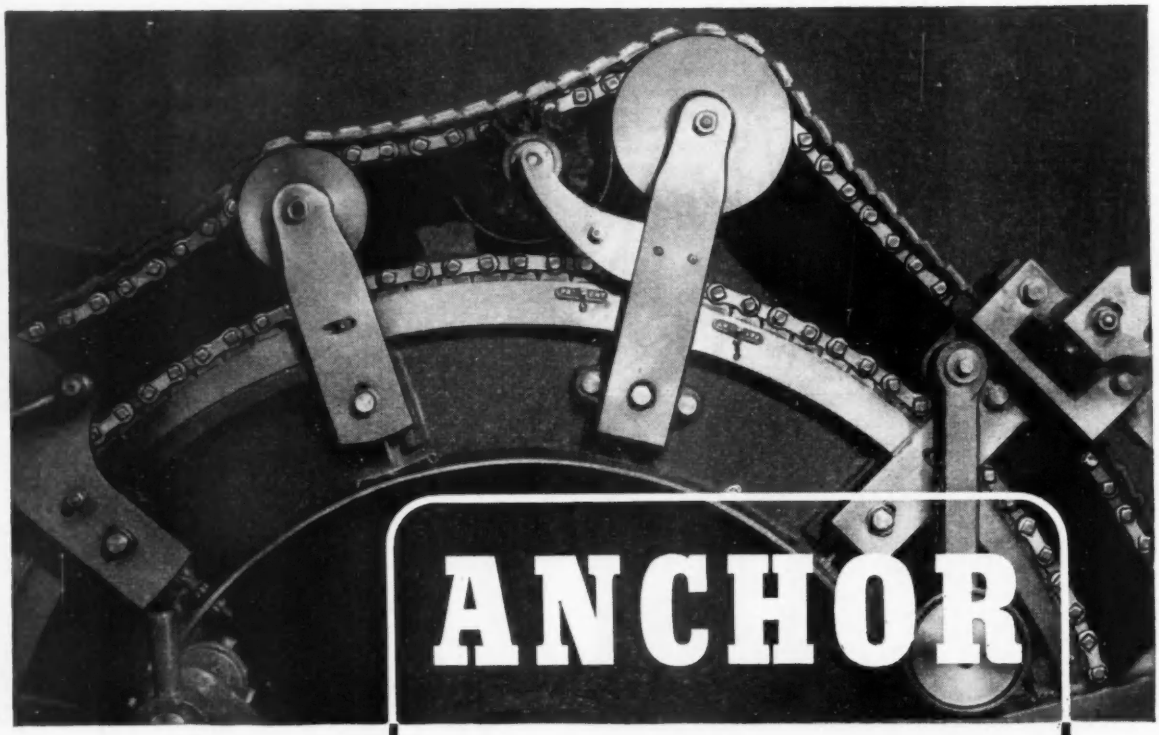

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A NEW SERVICE

Chains are now supplied boxed in pairs, for cleanliness of handling and storage. Right and left hand screws are also available, thus ensuring a 100% job.

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Our new Factory will provide us with greater accommodation and better facilities for the processing of STAINLESS STEEL which has been our speciality for the last 25 years.

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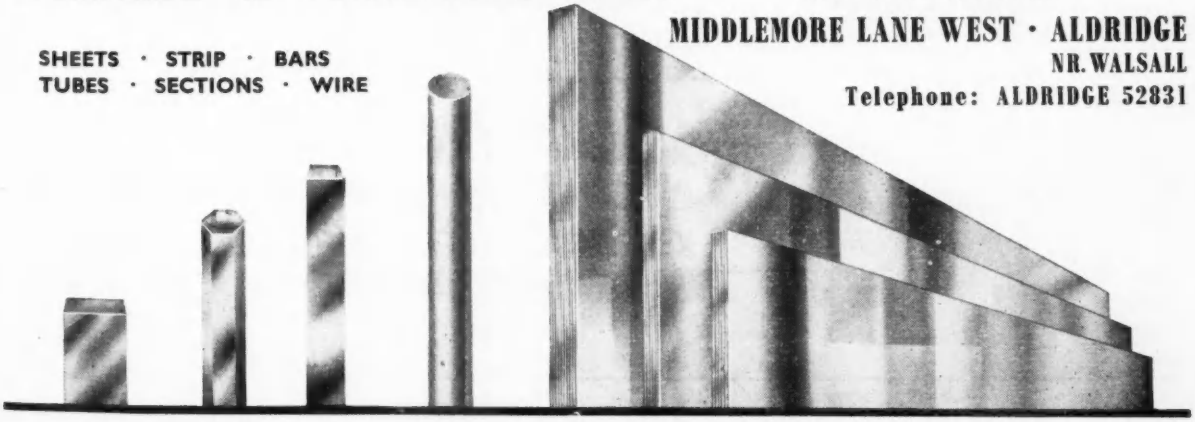
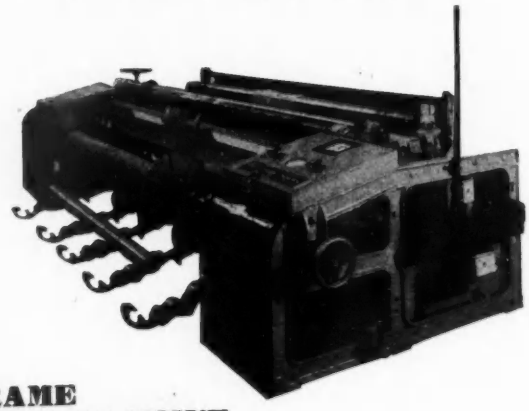
TUBES · SECTIONS · WIRE



BOUCHER MACHINERY for the CARPET INDUSTRY

HYDRAULIC BEAMER

Lockheed Hydraulics enable constant pressure to be applied to beam rollers, from nothing to 1,000 lbs. per square inch, each side controlled independently. Constant Peripheral Beaming Speed throughout entire range of beam, from 6" diam. barrel to 36" diam. flange, at three different speeds. Totally enclosed oil immersed Constant Speed H-Gear Unit. Warp Length guaranteed. Machine automatically cuts out at any pre-set yardage for any number of beams, until re-set.



Tube frame threaded with the spool in its spring holders; eliminates four operations (patents pending). Needles are brought forward by simple foot operated switch, leaving operatives' hands free to attend to interrupted ends and return to thread by the same operation. Tube frames can be threaded as fast as removed from the chain, thus facilitating immediate return to their last position in the chain. All needles have rounded crochet hook ends, preventing yarn damage and enabling smoother threading. All spool end strive difficulties overcome enabling, 100% threading even if strive is as much as 1" by our new full length comb. By fitting side supports the standard 4/4 machine can thread 2/4 to 16/4 Tube frames, or a machine can be supplied 12/4 in width. Tube Frame automatically clamped eliminating still a further hand operation.

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"CONSOLE" HIGH SPEED CARD CUTTER

Easier to use than a type-writer! Operator can be trained within an hour. Quick and simple method of colour selection only 1½ inches from the design paper. Automatically stops when card is cut, automatic numbering device, centralised lubrication system, high cutting speed and rapid conversion to other card sizes. Operator fatigue reduced to a minimum for the machine takes care of the Brainwork.

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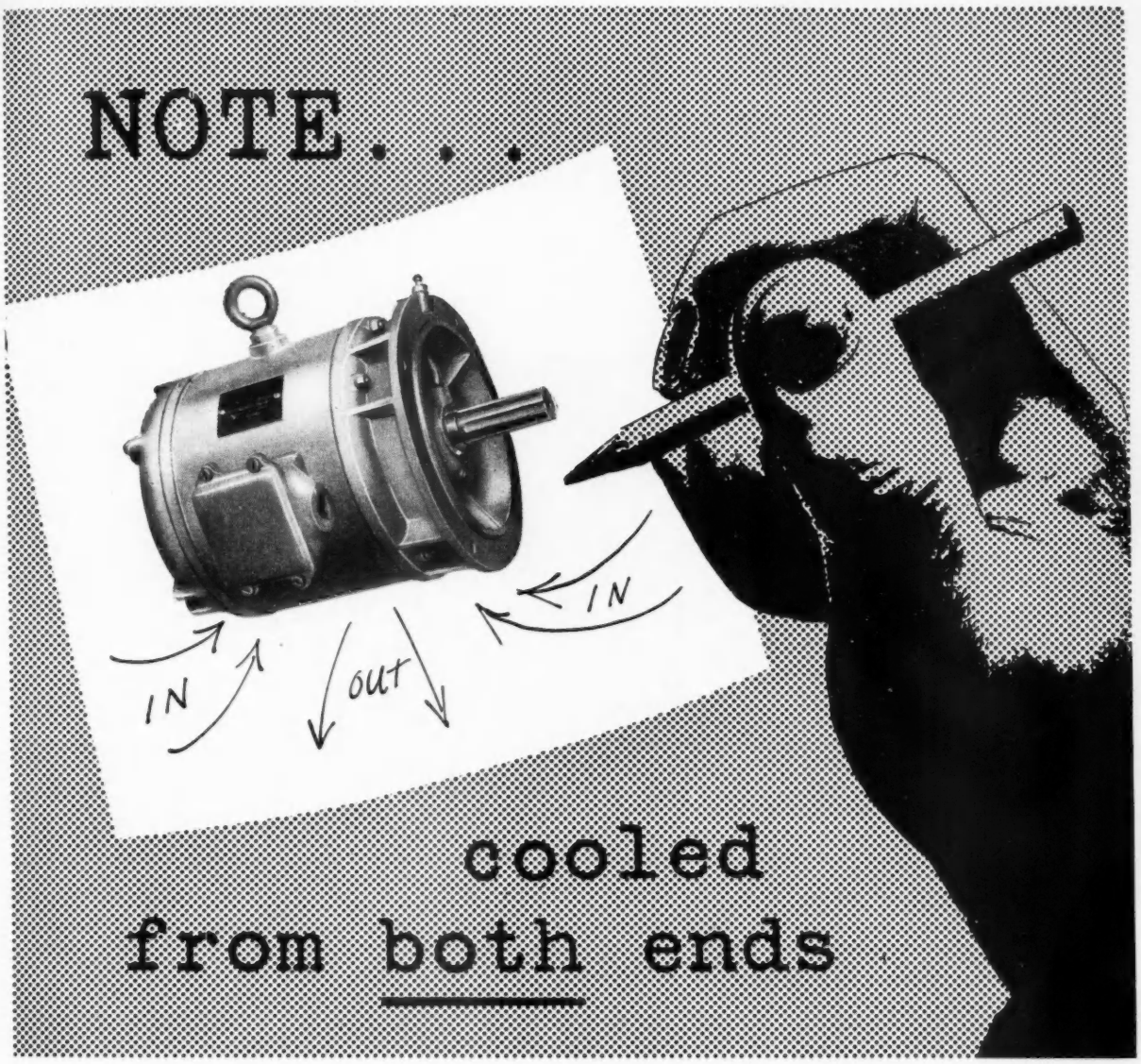

cooled from both ends

The radial ventilation of the new Crompton Parkinson Series 5 motors makes sense. Air enters at both ends, is directed over the bearings to keep them equally cool, passes over the end windings and is discharged — at a very low velocity — through a large opening between the motor feet. The internal deflecting baffles protect the windings completely.

Series 5 motors are, in general, a frame-size smaller and up to 40% lighter than previous standard motors of the same horsepower. Their performance conforms with B.S.2613 for Class E insulation; dimensionally they comply with new B.S. 2960.

Specifications, however, are not motors. They may fix sizes or set minimum standards of performance, but a motor is completely defined only by being built. Manufacture is perforce an empirical business — a matter of thousands of small decisions that must be made, for the most part, on experience. That is why the extent and quality of a company's manufacturing experience is important, and that is the real value of a name with a long history. For instance . . .

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LIMITED

MEMBER OF ATOMIC POWER CONSTRUCTIONS LTD.

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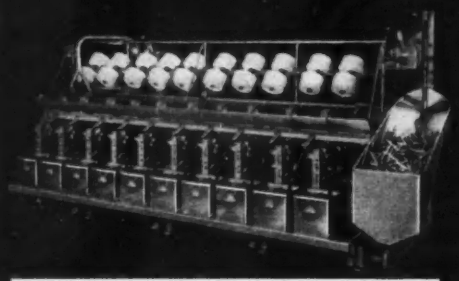
Schärer

Fully Automatic Pirn Winding Machine

for cotton and spun rayon, speed variable from 8000 to 11000 revs.



Advantages:

Standard machine with 10 winding units
It offers a great versatility to your weaving mill

Low Frame, Simplicity of construction
The work of the operative is reduced to a minimum

Double end swivelling creel
Permits a quick change from the empty to the full supply package

Automatic Stacking of the wound pirns
into boxes which can be carried direct to the loom.

Drive by V-belts
Each winding unit runs at the same speed

Simplicity of the winding mechanism
The gears are running in a dust-proof oil-bath

Ask for further details! Profit by our long experience, do not hesitate to consult us if you have any pirnwinding problems.

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Erlenbach/Zurich (Switzerland)

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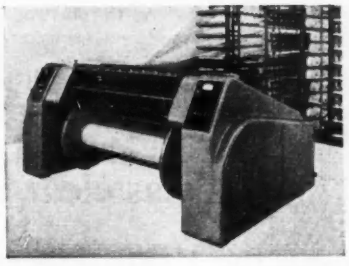
Are you aware of the fact

– that with preparatory equipment only the best is good enough and that price is not the most important factor?
Do you want to "earn" some £ 100 when buying a sizing or warping machine or would you rather have an installation which guarantees high productivity and first class warps for many years to come?

With the drop roller of this interesting design every broken end can be pieced, and the direct beam drive with pneumatic pressure even enables warping of the softest dye-beams.
All staple fibres and filament **yarns** can be processed.
We shall be pleased to send you additional information on the large number of further operational features.

RUTI



Ruti Machinery Works Ltd., Ruti-Zurich
formerly Caspar Honegger Switzerland

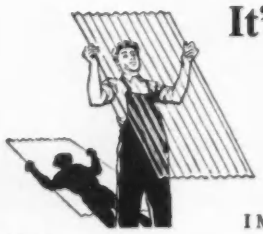
Interior view of Corrugated 'Perspex' installed over 10 years ago in the Dyeworks of S. Smethurst & Sons Ltd.

Yet another factory proves Corrugated 'Perspex' efficient as ever after 10 years

S. SMETHURST AND SONS LTD. are one of many firms who have proved the lasting qualities of 'Perspex'. Installed in their dyeworks at Bury over 10 years ago—giving as efficient service as when it was installed.

Corrugated 'Perspex' is the answer in all buildings, large or small, where it is important to have good light. No other roof lighting material transmits more daylight. It is tough, light in weight, easy and economical to install. Once in, there is an immediate saving on artificial light. It is built to withstand the severest weather and is unharmed by the corrosive atmosphere of most industrial areas.

Corrugated 'Perspex' is made in a wide range of profiles to match most corrugated roofing materials. If diffused daylight is required, Opal Corrugated 'Perpex' is available.



It's as clear as daylight—it must be

CORRUGATED 'PERSPEX'

'Perspex' is the registered trade mark for the acrylic sheet manufactured by I.C.I.

IMPERIAL CHEMICAL INDUSTRIES LIMITED · LONDON · S.W.1

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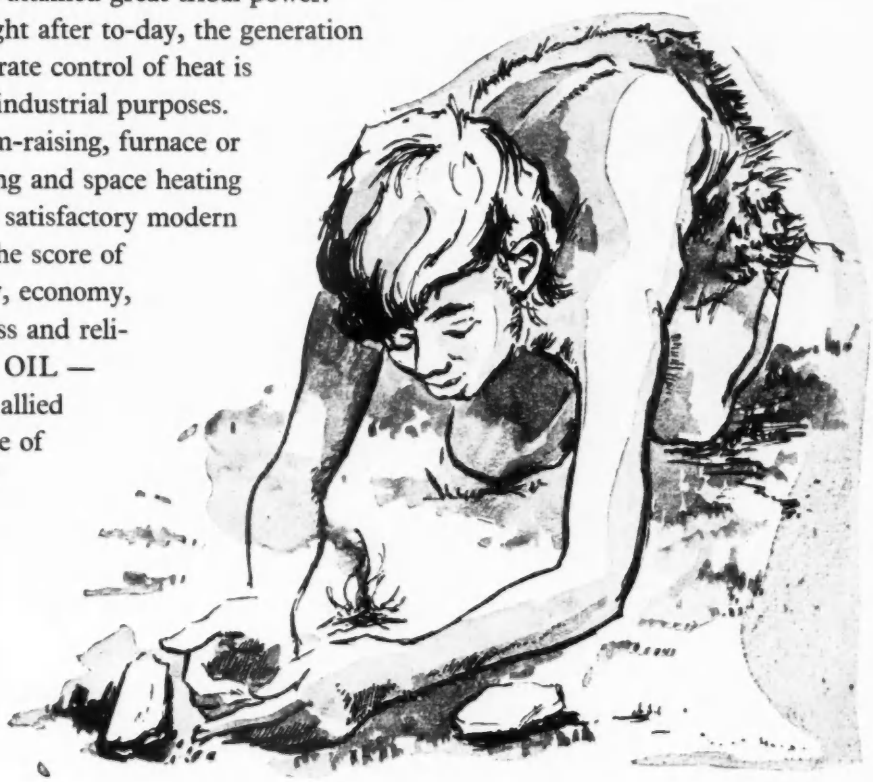
A first step in his advance to civilization was man's ability to produce fire and then to control it. In early times those who could make fire were sought after and attained great tribal power. Still sought after to-day, the generation and accurate control of heat is vital for industrial purposes. For steam-raising, furnace or oven-firing and space heating the most satisfactory modern fuel on the score of efficiency, economy, cleanliness and reliability is OIL — with the allied advantage of accurate control.



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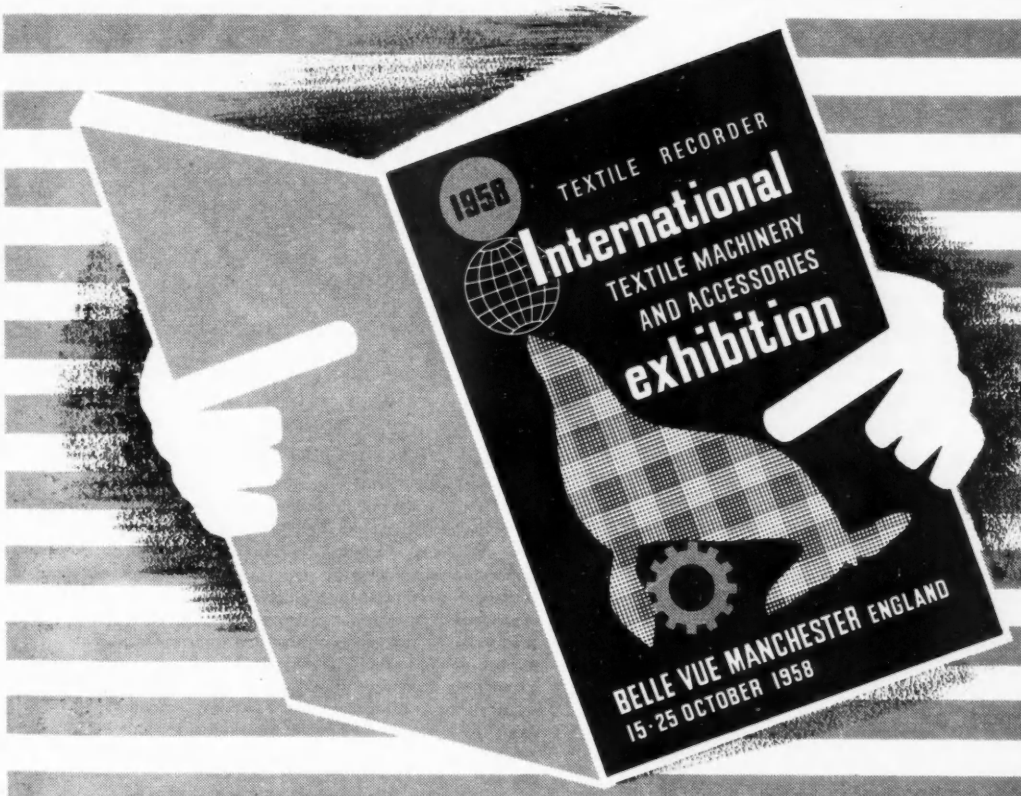
a visit to this great Exhibition in Manchester this October

is of more value than months spent in studying catalogues and price lists.

The latest developments in machinery and accessories by the world's

foremost makers, for every textile process from initial preparation to finishing

can be seen under working conditions . .



For information about exhibits and exhibitors and the arrangements for visitors to this event

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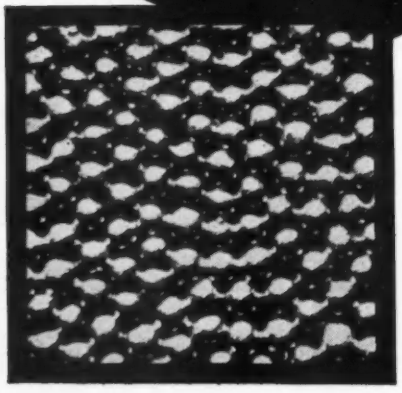
Old Colony House, South King Street, Manchester, 2.

for rigid precise

filtering of

liquids or gases

BOUND BROOK BRONZE FILTERS



This microphotograph shows a section of a Bound Brook filter. Note the porous structure formed by the use of spherical powdered metals.

The development by Bound Brook of a porous material for the filtering of liquids and gases is the result of many years' experience in powder metallurgy. It is produced from spherical metal powders of *closely controlled particle size* to give a rigid porous bronze structure of *uniform pore* dimensions. This metallic structure has excellent resistance to impact, is suitable for high pressure filtration in both directions of flow, better resistance at *high temperature* than wool, cotton, paper or plastic filters, and enjoys an almost indefinite life. The material is easily cleaned either by washing or by reversing the flow. Designed for such applications as filter elements, flow control devices, flame traps, etc., Bound Brook filters are available in six grades to suit required conditions and in the form of discs, plates, cones, cylinders, etc. Special shapes can be made to suit customers' requirements. Special cupro-nickel is available for corrosion resistance.

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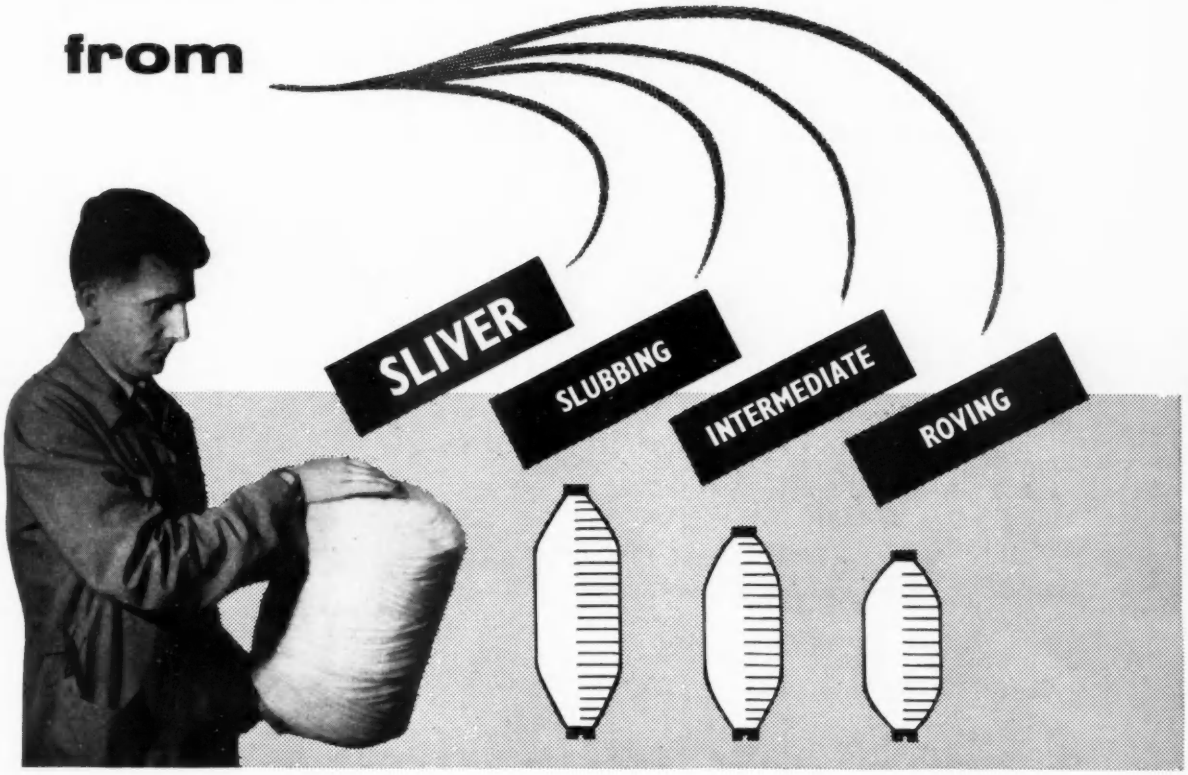
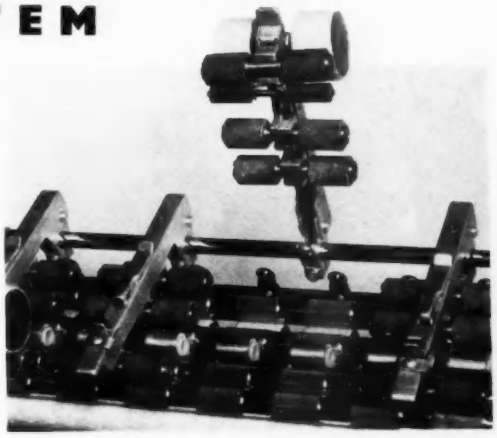
A certain method of improving yarn quality from



with Balmes NEW DRAFTING SYSTEM

The Balmes New Drafting System is entirely without aprons—clean, easy to handle and simple to maintain. It is capable of drafts of 150 and over and it remains a 4 line roller system only, which permits it to be fitted to any make of ring frame without presenting any mechanical difficulties.



Full particulars from

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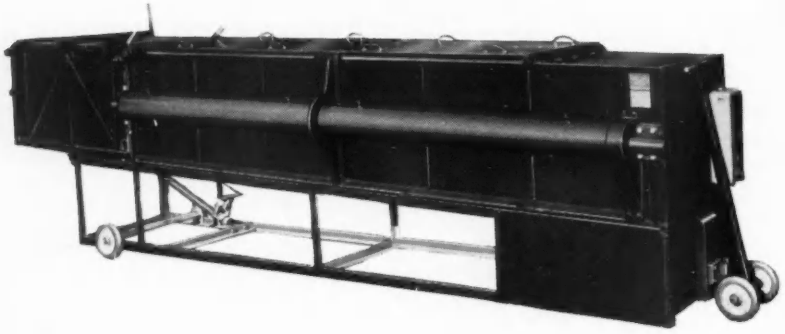

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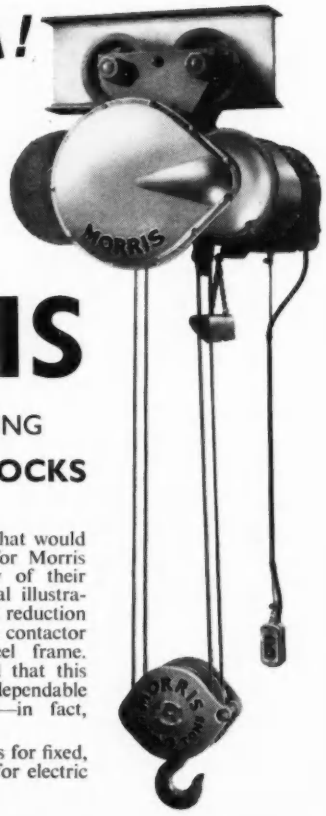

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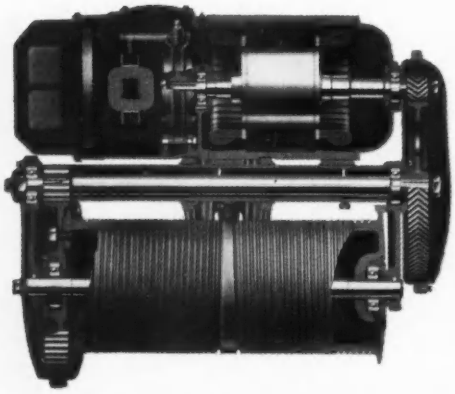

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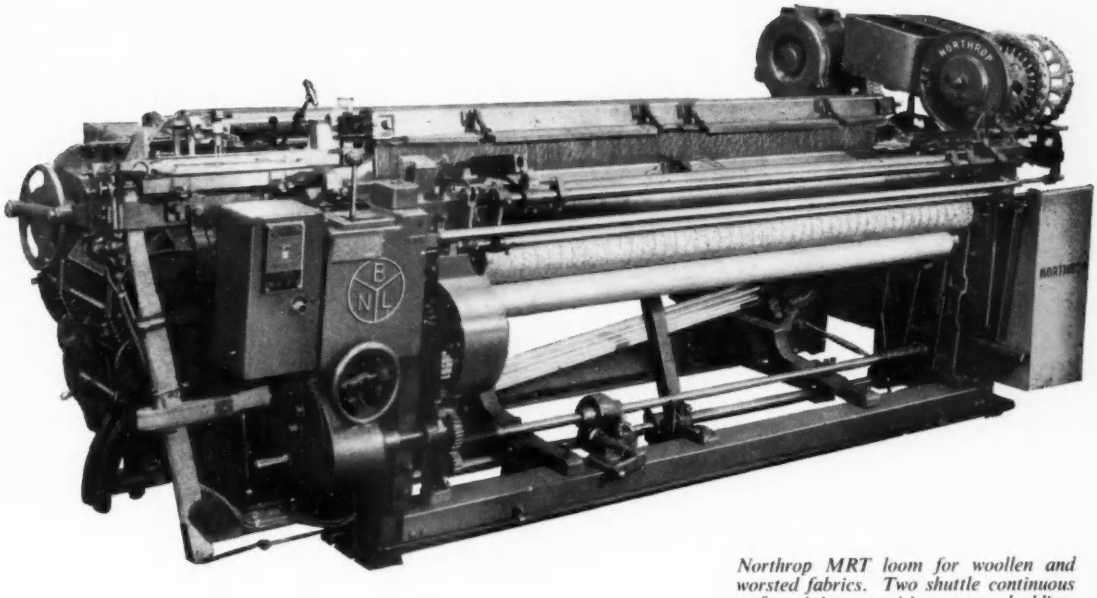

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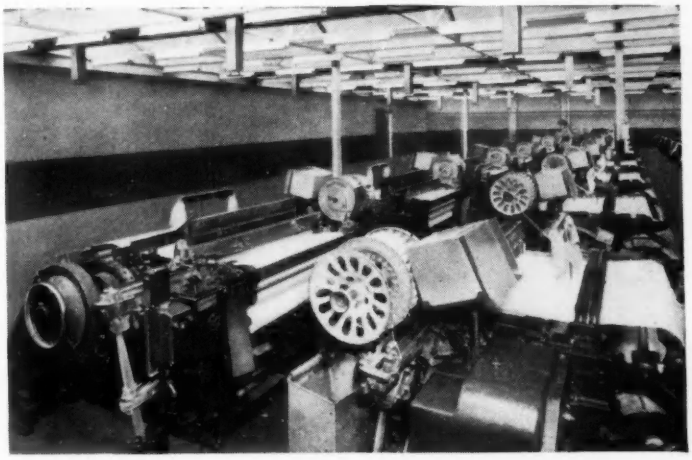

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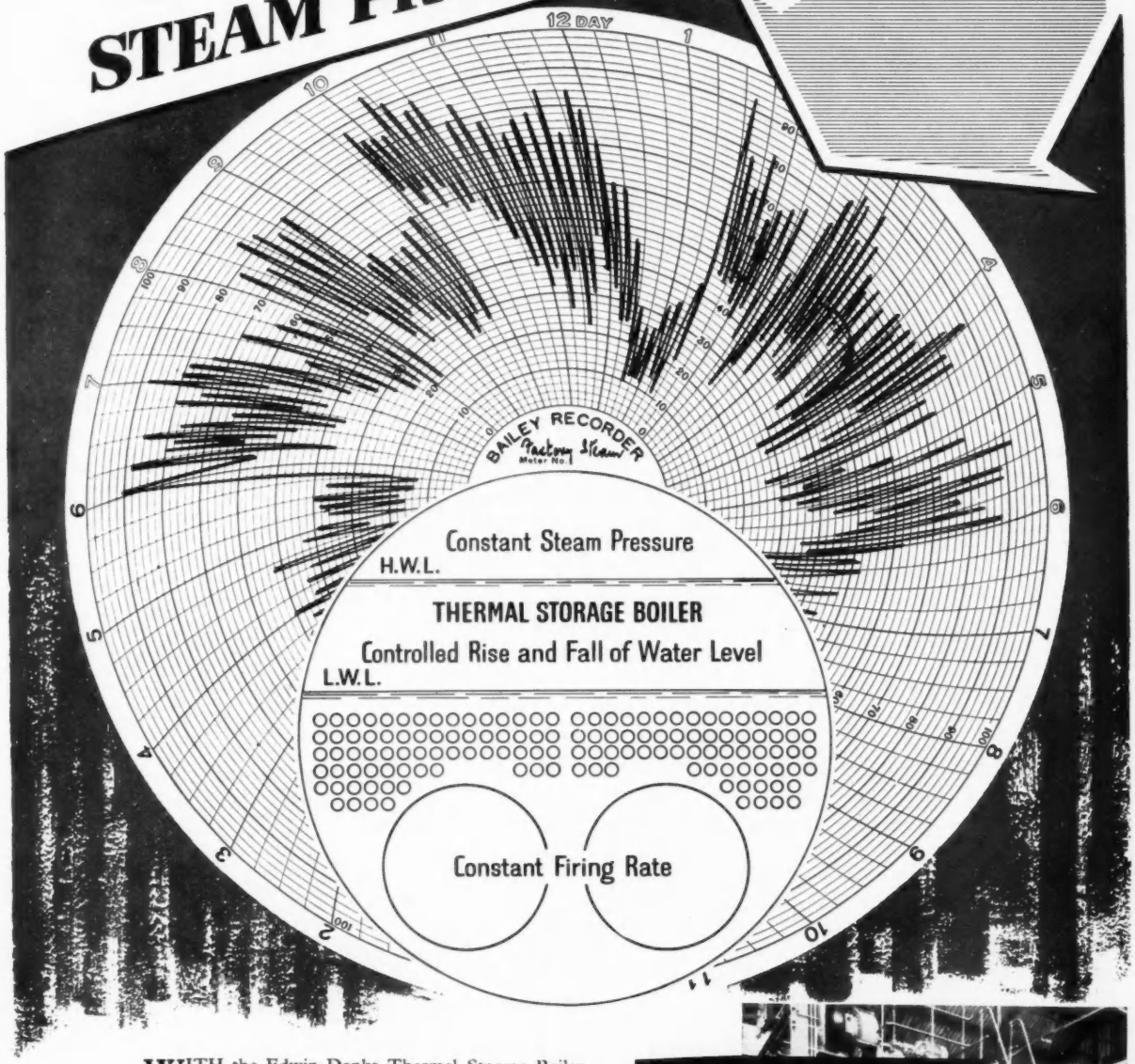

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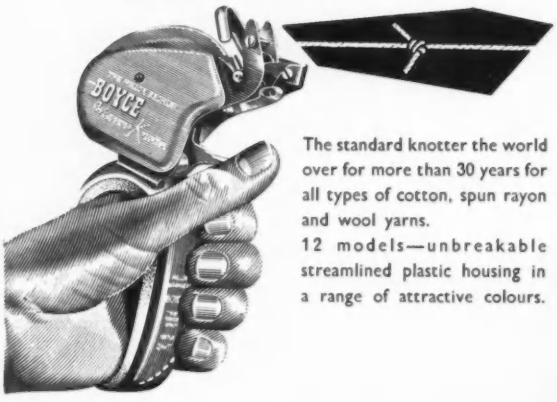

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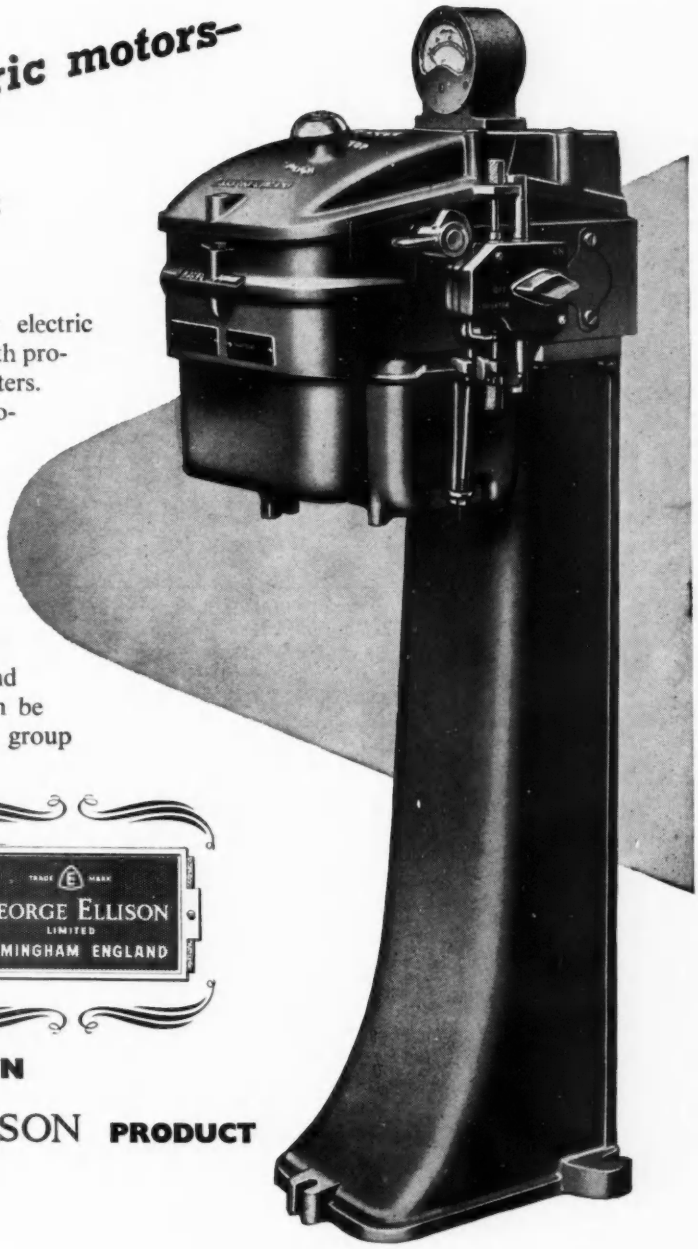

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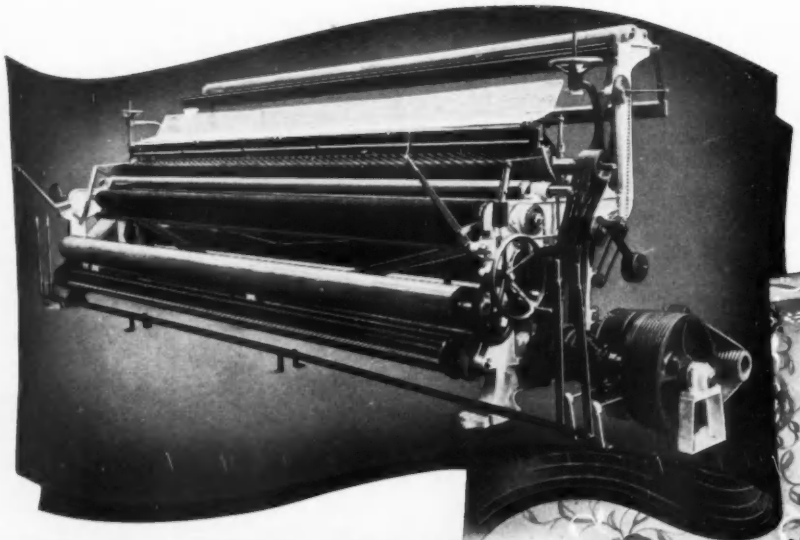

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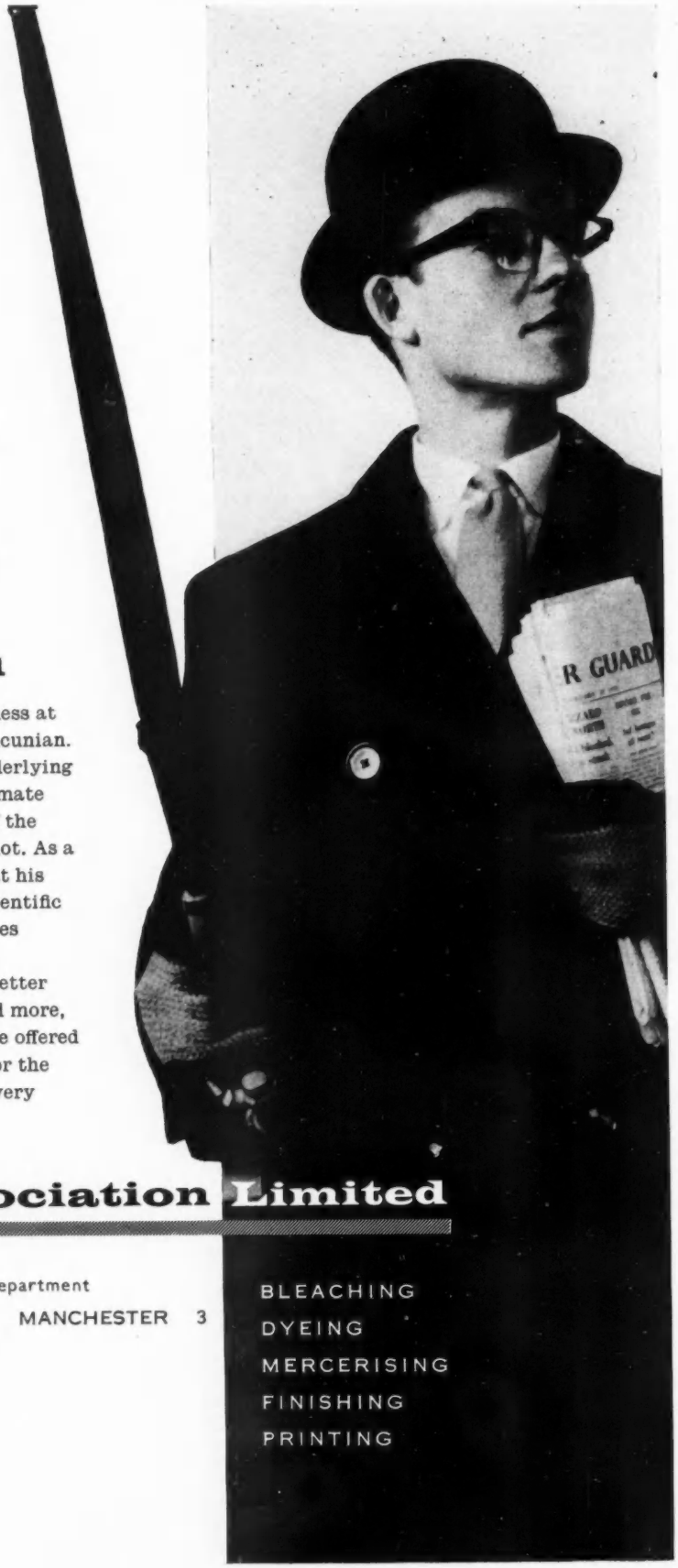

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MATERIALS - PROCESSES - PRODUCTION - MANAGEMENT

NO. 1004. VOL. 84 - AUGUST 1958 - MONTHLY Two Shillings and Sixpence

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THE TEXTILE MANUFACTURER (*Incorporating* TEXTILE INDUSTRY AND EXPORTER, THE TEXTILE MACHINIST, THE HOSIERY, LACE AND SILK MANUFACTURER, *and* THE TEXTILE COLOURIST) is published on the first Monday of every month.

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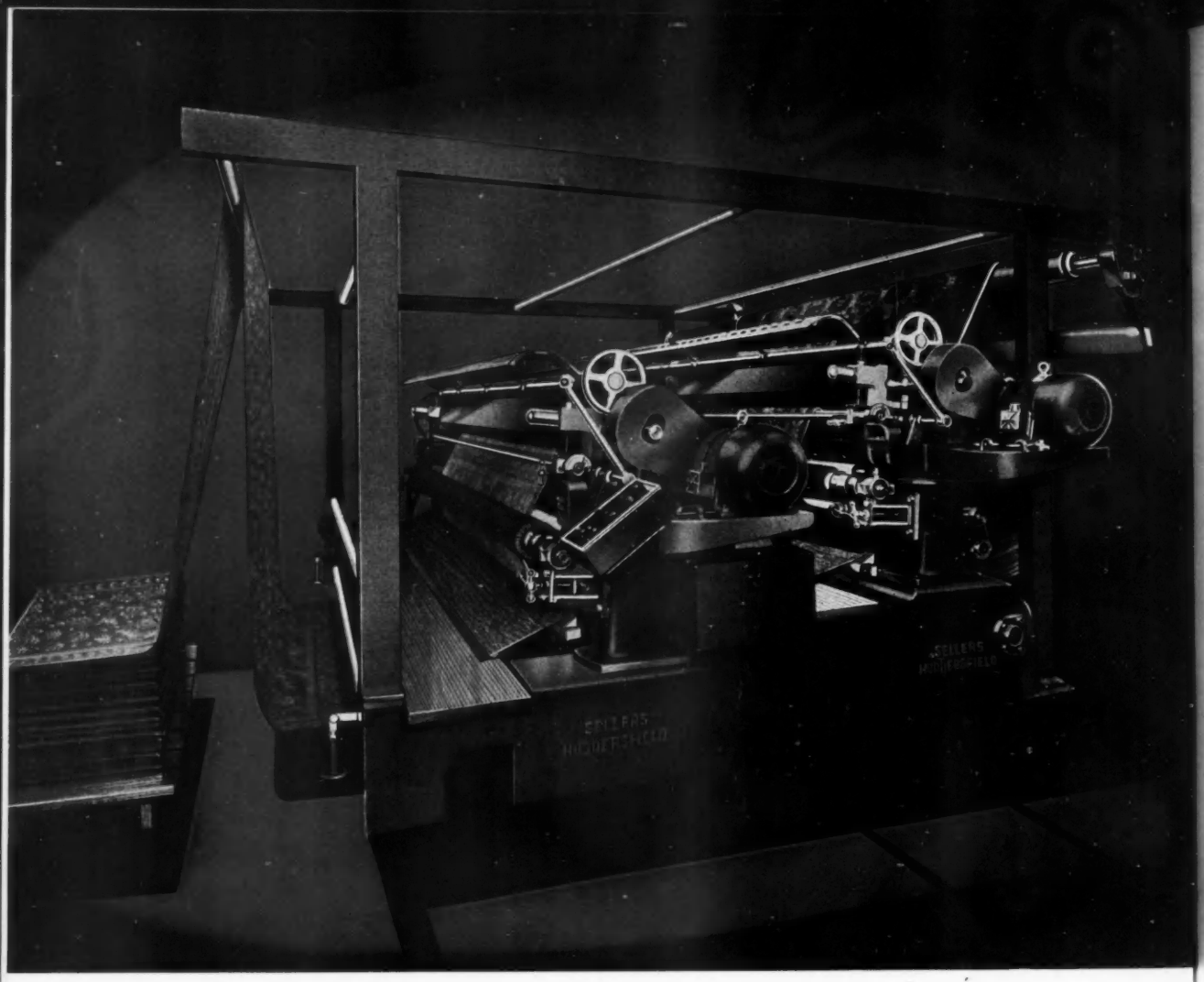

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Notes of the Month

STATE OF COTTON TRADE IN U.K., U.S.A. AND WESTERN EUROPE

REFERRING to the unhealthy state of the order books of firms in the producing sections of the U.K. cotton industry, the latest quarterly review by the Cotton Board points out that domestic demand has been slack with the unseasonable weather adversely affecting sales of summer garments. In addition, export shipments so far this year have been well below the previous year's level with no reason to expect any improvement in the near future. Imports have remained at a high level and merchants and distributors have been reducing their stocks. Extended holidays at Easter and Whitsuntide have been accompanied by more short-time and the permanent closing of more mills. Yarn output in May, allowing for working days lost through normal holidays was 14% less than in November. The output of spun man-made fibre yarn and mixtures was maintained but production of cotton and cotton waste yarns had fallen by 17% since November—the decrease in Egyptian type yarns being exceptionally marked. Again, allowing for holidays, cloth output in April was 12% less than in November and the rate of contraction was appreciably more for cotton cloth than for cloths of man-made fibres.

Exports of cotton piece-goods totalled 116 million sq. yds. in the first quarter, higher than in the final quarter of 1957 but less than in the corresponding quarter of that year. In April and May, shipments amounted to only 66 million sq. yds. Compared with a year ago the principal reductions in the first quarter's figures were in shipments to British East and West Africa, India, Ceylon, Canada, Scandinavia and Burma. In contrast, there were increases in exports to the Union of South Africa, Australia, New Zealand, Eire, the Belgian Congo and French West and Equatorial Africa. Exports of man-made fibre piece goods in the first quarter of 1958 were much the same as in the last quarter of 1957 but considerably less than in the first quarter of 1957. Exports of cotton yarn fell off considerably in the first three months of this year and were 20% lower than in the relatively high shipments of the corresponding period of 1957.

Imports of cotton piece-goods increased from 105 million sq. yds. in the last quarter of 1957 to 117 million sq. yds. in the first three months of 1958 and totalled 59 million sq. yds. in April and May. Imports during the first quarter were, in fact, slightly in excess of exports but this could be attributed in part to the extremely heavy imports of Chinese cloth which, owing to quota restrictions, will not be repeated. Imports of piece-goods of man-made fibres declined considerably from the high level of the preceding quarter and were much the same as in the first quarter of 1957. The decline from the preceding quarter's level was due almost entirely to a sharp drop in imports from Japan which are virtually all intended for processing and subsequent re-export. Total imports of piece-goods of man-made fibres amounted to 7 million sq. yds. in April and May compared with 10 million in the corresponding two months of 1957.

The U.S. cotton industry remained in a depressed state during the first quarter of this year. In terms of current weeks' production, unfilled orders for cotton cloth in March exceeded mill stocks by only 2·5 weeks' production compared with 3·6 weeks in March 1957. These stocks and the lack of confidence of buyers in future economic conditions have held fabric prices at a low level. In April, the average price of 17 grey cloth constructions was the lowest since August 1946. As a consequence, mill margins have declined and in April they were 10% lower than a year ago. In the first quarter of 1958, the consumption of raw cotton was 7% less than in the similar quarter of 1957 while that of man-made staple was 6% lower. The latest figures of cloth production relate to the fourth quarter of last year when cotton cloth production was 8% lower than in the corresponding quarter of 1956. The output of rayon cloth was 3% lower while cloths of synthetic fibres (especially nylon cloths) registered large increases. In harmony with conditions in the automobile industry, the total output of tyre cord and fabrics in the first quarter of 1958 was 25% lower than in the corresponding quarter of 1957. Exports of cotton piece-goods from the U.S. in the first quarter of this year were over 14% less than in the preceding quarter and as much as 18% less than the level of the corresponding period of 1957. Considerable declines compared with the preceding quarters' shipments took place in exports to the Philippines, Mexico and Venezuela. Exports of man-made fibre piece-goods were well below the levels of the preceding quarter and of the first quarter of 1957. The decline was due almost entirely to a decrease in shipments of cellulosic fabrics; the level of shipments of synthetic fibre piece-goods being more or less maintained.

The Continental cotton industries appear to be experiencing a period of lower activity. Cotton yarn output in these countries taken as a whole was about 1% below the level of the corresponding quarter of 1957. Output in Germany, Italy, Holland and Belgium was below the level of the first three months of last year. In Belgium, where some mills have been closing every other week and others operating only three days out of five, the decline was of 20%. Short-time working has been reported from the other three countries, although the situation in Germany is expected to improve due to the recently announced government intention to restrict imports. In France, where the only significant increase in production took place over last year's level, fears are expressed that the recent steady contraction of orders is the prelude to a textile recession. Western European exports of cotton piece-goods were

about 4% below the level of the last quarter of 1957 and about 8% below that of the first quarter of 1957. Exports from Belgium, France, the Netherlands, Portugal and Spain declined compared with a year ago while Italy was the only country to register a major increase in shipments. This was due mainly to increased shipments to Turkey, U.S.A., and Australia. The decline in Dutch exports was due almost entirely to the dwindling of trade with Indonesia which was offset to some extent by increased trade with Sweden, Belgium, Germany and French West Africa.

COMMON EUROPEAN MARKET

A FREE Trade Area in Europe between a group of countries known as "the other six" appears to be gaining ground. It has been thought that the existence of the Common European Market—if it is not joined by some form of larger Free Trade Area—might cause other European countries to join together in some form of Free Trade Area themselves. Indeed a move which could lead ultimately to something in this direction is the recent issue of a joint statement by the Industrial Federations and Employers' Organisation of Austria, Denmark, Sweden, Switzerland and the U.K. The idea which deserves careful thought appears to have found favour with certain sections of the textile industry of this country. Indeed, the Rayon Weaving Association, in its annual report, devotes much prominence to supporting British participation. It is, therefore, with a sense of lively anticipation, that the Textile Institute should be holding a conference at Gothenburg, from September 4th-8th, and that further meetings are scheduled at Copenhagen on the 9th.

The immense amount of research work on textiles which has been undertaken in Scandinavia in recent years may not be generally appreciated, in view of the many achievements of our own textile research organisations. There are three textile research institutes in Scandinavia—in Denmark, Norway and Sweden—and some of the fruits of that research may be seen in the shuttleless loom now working in the Department of Textile Industries at the Manchester College of Science and Technology; and in Prof. Nils Gralen, Sweden has produced a figure of world stature in his research work on the wool fibre.

It is significant that from Manchester and district come the authors of three of the nine papers to be given at the conference—Dr. G. Holden of British Rayon Research Association, Heald Green, Manchester, will speak on "Tensile Properties of Textile Fibres at Very High Rates of Extension". "The Mechanics of Twisted Yarns: Tensile Properties of Continuous Filament Yarns" will be by Dr. J. W. S. Hearle, A.Inst.P., H. M. El-Behery, M.Sc., and V. M. Thakur, B.Text. (Manchester College of Science and Technology), and Mr. H. M. Taylor, M.A., A.Inst.P. (British Cotton Industry Research Association), will speak on "The Tensile and Tearing Strength of Cotton Cloths." The fourth paper by an author from this country is "The Dynamic Mechanical Properties of Wool at Very Low Frequencies," by Mr. F. L. Warburton of Wool Industries' Research Association, at Leeds. The concept of a professional body with a high code of ethics is a peculiarly English development, and the value of such a body—and its influence on world trends—is to be seen by the Institute's arranging for the presentation of the majority of its papers at this overseas' conference to be by workers from abroad—surely an example of a free platform for the interchange of science, research work and technology in the subject—theme of the conference, "Mechanical Properties of Textile Materials."

The overseas' papers and their authors are: "Stress—Strain—Time Relationships of Non-uniform Textile Materials," by Mr. P. Kenny, B.Sc., and Dr. M. Chaikin, G.I.Mech.E., F.T.I. (New South Wales University of Technology); "Characterisation of the High-Speed Impact Behaviour of Textile Yarns," by Dr. J. C. Smith, Dr. F. L. McCrackin and Dr. H. F. Schiefer (U.S. Department of Commerce, National Bureau of Standards, Washington 25, D.C.); "The Torque in Highly Twisted Nylon 6 Monofilaments," by Mr. J. J. Mertens (N.V. Onderzoekingsinstituut Research, Arnhem); Mechanical Properties of Viscose Rayon Fabrics," by Mr. T. Eeg-Olofsson, Tekn.D. (Swedish Institute for Textile Research) and "Mechanical Properties of Chemically Modified Cottons," by Dr. C. M. Conrad (Southern Regional Research Laboratory, U.S.A.)

EXPORTS OF WOOL TEXTILES

THE first quarter of 1958 was a quieter trading period for wool textile exports than the comparable period of 1957 according to the most recent issue of "Wool Textile Bulletin." The widespread recession in industrial activity was reflected in a 3% drop in U.K. exports of tops and wool cloth and a heavier fall of 17% in yarn shipments. As a result, the overall volume of overseas deliveries was 6% less than in the first quarter of 1957, which, in spite of the slightly higher prices currently prevailing, caused a 4% fall in earnings of foreign currencies. British top exporters again showed their adaptability during the first three months of the year. In spite of heavy falls in shipments to many of our largest markets such as Canada, Japan, Pakistan and Scandinavia, the total quantity shipped was less than 3% below last year's first quarter, when, it will be remembered, exports were establishing a new record level. The chief factor in this gratifying performance was the big increase in shipments to China, which together with gains in India, Greece, West Germany, Egypt, and some of the smaller markets, went a long way to offset losses in North America, Europe and the Far East.

Exports of woollen and worsted yarns experienced a heavier quarterly fall than for some time past, chiefly as a result of reduced shipments of worsted types to West Germany. Virtually all our other major markets also took less yarn than in the first quarter of last year, the sole exception being New Zealand, where shipments increased by 8%. The rate of decline in exports to some markets did slow down during the first quarter, but a little time must pass before it can be seen whether this was solely due to seasonal factors or not. Woollen and worsted cloth exports in the first three months were 2% less than in the same period of 1957. This cannot be regarded as discouraging, in view of the abnormal fluctuations which occurred in some of our largest markets. Shipments to Canada were 23% less than a year ago and, those to Denmark, Japan and the Benelux countries also fell sharply. Exports to France were badly affected by the quota operative there and other countries taking less cloth included Iran, Syria, Cyprus and Norway. These losses were largely neutralised by increased trade with the U.S.A. (a strictly temporary effect in reverse of the tariff quota), South Africa, New Zealand, West Germany, Sweden and some smaller markets.

Summary of Exports of Wool Textiles

		1st Quarter 1957	4th Quarter 1957	1st Quarter 1958
Tops	Mill. lbs.	21·805	19·603	21·189
Yarns (a)	Mill. lbs.	8·108	7·657	6·697
Tissues (b)	Mill sq. yds.	29·586	24·870	28·686
Total of all types of Wool Textiles	In Mill. £	37·802	34·405	36·343
	In Mill. lbs. (c)	47·387	43·426	44·493
	Ave. Price in d. per lb. (c)	186·6	186·0	191·4

(a) Includes woollen, worsted and hair yarns.
(b) Includes woollens, worsteds, fine hair, pile and mechanised cloths, but excludes blankets.
(c) Excludes fine hair, pile and mechanised cloths, etc.

Cleanliness in Textile Mills: Pirnwinding

There is little point in paying careful attention to cleanliness of pirn winders, pirns and pirn boards if the supply packages themselves are subject to soilage. Handling accounts for a great deal of cheese and bobbin soilage and operatives should be specially instructed in hand cleanliness

By J. WHITE

CLEANLINESS is of special importance in pirnwinding, because soiled-weft faults are difficult to remove, and are frequently woven into fabric before detection. The modern tendency to increase the number of looms per weaver necessarily decreases the supervision time per loom, and where a weaver patrols 12 non-automatics or 36 automatic looms, a weft fault may weave for more than a yard before it is seen by the weaver; in many cases the soiled weft may be out of sight round the fabric roller before the weaver can detect the fault, and the weaver may be genuinely unaware of intermittent weft-soilage faults until her attention is drawn to it in the warehouse. Weft soilage is a fault that cannot be detected by mechanical means; stop-motions can be fitted to detect broken ends and weft breaks, but weft soilage faults must be regarded wholly as a human responsibility, and the primary task is to prevent soiling the weft at the source. In a recent study of oil-stain problems, the British Rayon Research Association made 14 weaving mill surveys of sheds weaving a wide variety of cloth sorts including taffetas, poults, satins, twills, voiles, and brocades in viscose, acetate, and nylon, mostly filament but some spuns. Dirty weft accounted for 24% of oil stains in the grey cloth examined, and this was not materially reduced by scouring and finishing, because the percentage of soilage due to dirty weft after finishing was 20%.

The first principle of clean processing is a clean workroom where good housekeeping standards are maintained. The construction of many workrooms is faulty and is not conducive to the maintenance of clean working conditions, but supervision should endeavour to make the best use of the workrooms provided. Every effort should be made to improve faulty building structures, but where this is not possible, the difficulties presented should be accepted as a challenge to one's ingenuity and perseverance. Cleanliness is generally habitually good or habitually bad, depending on the quality required and the vigilance of the winding master. If the roof is not windproof, dust will be blown about and will settle on the pirning machines and the pirned weft. This can be minimised to some extent by regular cleaning of the roof gantries and trusses by a suction cleaner similar to the Bak-Vac ("T.M." Nov. 1956, page 575).

Dusty floors create a problem too, and where possible vacuum sweepers should be used in preference to brushing which tends to agitate and spread the dust if the floor has not been previously damped by wet sawdust or water. Pirnwinding is a job that requires the operative to be constantly walking about from spindle to spindle, and timber floors are kinder to the operative's feet than concrete, but worn timber floors trap waste yarn, and floor-cleaning difficulties are experienced. The ideal type of floor for pirnwinding is a smooth hardwood floor with a non-slip polished finish. This enables the floor to be swept and cleaned efficiently without creating dust, and operative foot-fatigue is reduced to a minimum. Room temperature and humidity make a difference to cleanliness, particularly if conditions are such that the pirn-winder's hands are sweaty and sticky. Temperature of 76°F. and 70% R.H. is suitable for nylon processing, and as the yarn is generally sized it is allowed to lie about 16 to 24 hours in the winding room to reach equilibrium with room conditions. The storing period is a potential source of soilage if the yarn is not covered with a dust sheet or kept in a place where dust and passing traffic are avoided.

Pirning machines of all types require efficient and regular lubrication, and this is particularly necessary in the modern machines where the various gears run at very high speeds. Many of the older types of pirnwinding machines are still in use for natural and spun rayon yarns, and the fibrous nature of these tend to accumulate "fly" on all parts of the machine and frames. This is accentuated if finely-set clearers are used in the pirnwinding process, and the "fly" should be removed as efficiently and as frequently as possible. Machines in which the pirning spindles are driven by endless belts or tapes from a tin roller, are difficult to clean if the belts or tapes are contaminated with grease and "fly." The traverse motion of such machines is usually motivated collectively by a cam which has to be lubricated and should be covered by a shield to prevent accumulations of dust and "fly" building up on the cam; the latter causes bad chase building. A portable vacuum cleaner is used in some mills to continuously and progressively clean the "fly" from a number of machines, the latter being determined by the amount of "fly" accumulating. Vacuum cleaning does not remove "fly" that has settled on oily surfaces and oily bearings, and it is suggested that the machines should be completely doffed and cleaned at the finish of each shift. Some mills boost efficiency by letting the spindles run on after the operatives have gone home; the stop motion stops the spindles when the pirns are full, and the machine is doffed the next morning. With this method the

machine is never completely doffed, and if cleaning is done while the pirns are on the spindles, the yarn and the spindles may be soiled. If it is essential to run out the spindles after the pirners have gone home, it is a good plan to have one operative working late who can doff all the spindles when the pirns are full, and then clean down the empty machine, ready for a clean start the next morning.

Section 20 of the Factories Act specifically prohibits women and young persons from cleaning any part of a prime mover or of transmission machinery while these are in motion, and from cleaning any part (note that this is not limited to parts dangerous in themselves) of any machine, if by so doing they would be exposed to risk of injury from any moving part either of that machine or of any adjacent machinery. It should be noted that this covers all forms of manual cleaning, whether with brushes, cloths, waste, or anything else, or even by hand alone. When women are cleaning down the machines this should be done after the machines are doffed and stopped. Continuous cleaning while the machines are running can be done by male labour.

In a modern non-automatic pirning machine there are ten spindles on each side of the machine, and the gears for each set of four spindles, two on each side, are totally enclosed in a gear box which has an oil bath or sump similar to that under a motor car engine. When the machine is running, the oil heats up and a fine oil spray lubricates everything inside the gear box. As the four pirning spindles and the four screwed traverse bars protrude from the gear box, oil will seep through the bearings if the brass bushes are worn. This is especially the case with the traverse bars, because they have a piston-like movement to make the necessary traverse for building up the pirn. The gland from which the spindle emerges should be packed with suitable string and then fitted with a gold-sized washer, or a felt washer may be used. The gland has a drain hole whereby the oil runs back into the sump. Worn bushes or worn gland packings should be replaced as soon as possible or oil will percolate and run on to the spindles and frame. If oil seeps from the boxes or the spindles it will creep along the spindles and bars, and may soil the inside barrel of the pirn and the pirnwinder's hands. The fact that a box of whirling oil is located so near to the actual yarn being pirned is a potential source of soilage which surprises quality control experts who investigate a pirning machine for the first time, but the trouble-free efficiency of these machines over long periods is the general experience of many winding masters. A British automatic pirning machine operates without an oil bath; this is done by using modern self-lubricating materials, plastics, light aluminium alloys, and ball bearings.

If pirns are tight on certain spindles the latter should be taken out and reduced to uniform dimensions as soon as possible, because tight spindles always cause production loss and yarn soilage. The operative has to grip the pirn too tightly to pull it off the spindle, and this tight grip inevitably hand-soils the yarn on the pirn. Before reducing the spindle, however, the possibility of bastard-size pirn bores should be investigated. Sometimes a new lot of pirns is slightly undersize at the bore, and this may correct itself by wear on the shuttle tongues and pirning spindles, but in the meantime the pirner and weaver experience difficulty with the undersize pirns. Every new lot of pirns should be tested with a taper gauge, and should be returned if not up to specification. If cardboard pirns are distorted in the shuttle tongue they may be tight on the pirning spindles; this was fairly common when it was necessary to pack shuttle tongues, but welsh-hat pirns require no tight packing, and the pirns are not usually distorted nowadays.

The modern non-automatic pirnwinding machine is driven by a flat belt at the right-hand side of the machine, and although the belt is totally enclosed, the high speed disturbs the air at this point, and the pirning spindles near the belt should be specially watched for soilage. In addition, the "gainer box" which houses the driving mechanism is situated near the belt-end of the machine, and oil may seep from this box; the lid cover of the latter should be cleaned daily and leaks should be dealt with immediately. Although it may seem unnecessary to the initiated, "green labour" should be specially instructed not to lift the lids off any of the gear boxes. If the gainer box lid is lifted while the machine is running, the hot oil will spray out. In some machines there is a cast-iron top casing on part of the gear box, and then another lacquered tin casing is placed over the cast iron casing. The latter prevents accidents if green labour lifts the top casing to see the works. One machine has a special lip on the gear casing, and this prevents the oil from running up the sides of the casing and splashing on to the lid. One modern non-automatic pirnwinding machine with a self-acting wind, has no gears nor complicated mechanism that would collect dust or "fly."

Three or more pirnwinding machines can be driven by one motor, and when this is done, a long driving shaft, together with fast and loose pulleys for each machine, is necessary. If the shaft is overhead, the potential soilage from the shaft and driving belts is very real and apparent, and precautions can be taken. In modern machines the common driving shaft is under the machines, and is about 12 ins. from the floor. The shaft should be totally enclosed to avoid accidents and to prevent waste and "fly" adhering to the revolving surface. Suitable gaps have to be made in the covering for lubricating the shaft bearings, however, and care must be taken that excessive lubricant does not splash upwards towards the pirning spindles. Excess oil will also soil the floor and cause accumulations of oily "fly." If the machines are on an upper floor, tin drip trays should be fitted to prevent the excess oil seeping through to the floor below. These trays should be cleaned weekly, and the degree of over-oiling can be assessed by the amount of oil on the trays.

Cleaning Non-automatic Machines

It is suggested that the machines can be cleaned properly only if the spindles are completely doffed and all the supply bobbins, empty pirns, boards, etc., are removed from the machine. This job can be done at the week-end when (a) the machines could stop for one hour before closing time for a thorough cleaning, or (b) the cleaning could be done after normal working hours by specialist labour or by selected pirnwinders working a rota system. When the machine is cleared, every part should be systematically cleaned, taking care that the porcelain yarn-guides, the spindles, and the threaded bars are specially clean. The porcelain guides are difficult to clean properly, because the whole surface cannot be seen. Fig. 34 shows black solidified dirt on the porcelain guide of a chase former. The guide had to be unscrewed from the former in order to take the photograph.

The threaded bar is lubricated internally, and worn gear-box bushes

Fig. 34. Soiled porcelain guide

enable the hot oil to leak from the gear box; this leaking oil generally runs down the frame, but some of it may work its way along the threads on to the bar. When the pirner is pushing back the builder to start-up a new pirn she may inadvertently touch the soiled threaded-bar and soil her hands; this will soil any yarn she touches subsequently. Pushing the empty pirn or tube on to the spindle with soiled hands is a serious fault, because the pirn base will be soiled and will soil the yarn as it builds up on the pirn. The knock-off trigger at the tip-end of the spindle should also be cleaned regularly. The pirner handles this trigger for every start-up, and if it is soiled her hands will be soiled also. Soilage faults may not be apparent at the pirnwinding stage, but will be very obvious at the weaving stage, and it is very important to be able to trace such a fault to the culpable pirner. This can be done by attaching a label with the operative's clock number or name to every batch of weft issued. Operatives become careless when they are not taken to task about faults originating at their machines, and it is good policy to follow up every complaint. Mr. Shaw of the Cyril Lord Ltd. organisation has said that price competition is not the only serious factor to fear from Japan—a more serious factor we have to face is that of "losing face" if faulty or unsatisfactory yarn or cloth production is traced to a person.

If the pirning spindle is soiled at the butt end, and the pirner wraps the starting tail round the spindle, the tail will be soiled when the full pirn is taken from the spindle; if the starting tail is from 1 to 2 ins. long it may, (a) soil the pirner's hands as she pulls the pirn off the spindle, (b) soil the pirn board, (c) soil the adjacent pirns on the board, and (d) soil the weaver's hands and the woven fabric. The finishing tail, which is manually latched round the pirn and is then broken or cut off by the pirner, may be hand-soiled, or if the tail-end is too long it may foul soiled brackets, etc., and become a soiled tail.

The tension guide, whether of the gate or disc type, accumulates fluff and dirt, and must be cleaned regularly. This is required most when fibrous yarns are being processed, but even when filament rayon is being run, the outside of a cone or cheese is apt to be dirty, and some of this will be scraped off and will accumulate at the tension device; this will soil the yarn intermittently and may increase the drag abnormally if the gates or discs are not cleaned regularly. The gate tension device at Fig. 35 shows rust stains; this can be avoided by using gates made of stainless steel or of porcelain. Tension is very important in winding filament rayon and synthetic yarns, and any undue braking of the yarn by dirt or "fly" accumulations on the guides or tension devices may seriously affect the product, e.g. pirn periods, broken filaments, stretched yarn, and excessive breaks. If the tension is checked twice daily by meters, this may help to detect fouled guides, etc.

The practice of fitting an oily mop at the gate tension device in order to lubricate the yarn, to facilitate subsequent processing or to kill static, should be discouraged. If the mop is lubricated too freely, the oil may drip on to the running surfaces of the tension device, and if dust has accumulated at the edges of the gates, the oil plus dust will form a dirty paste which will soil the yarn intermittently. In addition, uniform tensioning of the yarn is difficult if lubricating mops are fitted, because it is difficult to maintain the same oil content in each mop.

Cleaning Automatic Pirnwinders

Automatic machines are preferably run on the shift system in order to use the machines to maximum capacity and to recover the capital charges. The continuous running increase the "fly" and soilage potential, and precautions should be taken to ensure that cleanliness is maintained. The type referred to in detail is a circular battery model, but most of the notes apply equally well to the vertical magazine and other types of automatics. The battery must be clean and free from dust or the pirn bases will be soiled, and dust particles may fall on to the full pirns lying under the winding area when the soiled pirns are ejected from the battery into the loading tray. In some cases pirnwinding batteries are filled by special battery fillers, because it is found that battery filling soils the pirnwinder's hands and so causes soiled yarn; this acknowledges the fact that pirns are not clean, and if the yarn being pirned has to be specially clean, the pirns should be basically clean too even if it means cleaning each pirn before use. The pirn-delivery chutes from the battery may also be soiled by the soiled pirn-bases, and it is good practice to clean the battery and chutes at least every week. This is particularly necessary if fibrous yarns are being processed, because the "fly" will accumulate on the battery bottom and on the sides of the chutes.

When full, the pirn falls with gravity on to a reception tray and guide which delivers the full pirn to the pirn box placed beneath the pirning area. The reception tray is partially hinged to ensure gentle handling of the yarn, and the working surfaces of the tray are covered with felt or baize to prevent damage to delicate yarns. This covering is generally of dark green baize and it becomes soiled after several months of continuous use, particularly if pirns with soiled welsh-hats are used. It is suggested that a light-coloured felt covering is used here to facilitate the detection of soilage and to make an obvious indication that a soiled covering should be replaced. The pirn-tip guide platform is not covered with baize and should be cleaned daily. When fibrous yarns are being processed the felt covering should be brushed daily with a suitable stiff hand brush in order to remove accumulations of "fly." Automatics for cotton weft need not have the tray platform covered with baize, and the full pirns generally fall about 2 ft. into a weft bin without harm, unless welsh-hat pirns are soiled, etc.

The oscillating tray, which places the empty pirn in the winding position when the full pirn falls out, should also be cleaned out every morning, because the atmospheric dust and processing "fly" accumulates thereon. This cleaning can be done quite simply and quickly as the tray swings

Fig. 35. Soiled gate-tension wheel

out quite easily. The foot-shaped guide, that takes the weft thread out of the path of the full pirn, etc., as it falls, is frequently covered with a thin film of oil, and this should be cleaned every morning. The weft cutter must be sharp and efficient, or "fly" will accumulate from ragged cuttings, and the fall of the full pirn may be retarded.

An improved model has a pirn-tray loading device in which the full pirn is not subjected to the shock or bruise of a direct drop; the full pirn falls on to an obliquely placed carriage or tray which swings downwards about 120° when loaded, and delivers the full pirn to the special pirn box without bruising. This pirn tray should also be cleaned weekly, and the felt covering should be of a light-coloured baize. This method of avoiding a big gravity drop is important with tender twistless filament rayon yarns which may be bruised easily if they fall on to the tray or on to other pirns in the box. The weight of the full weft pirn is also important in this connection, and some consideration is given to the tare weight of the pirns. The high compression effect of nylon weft on paper pirns has encouraged the re-introduction of wooden pirns and the advent of plastic pirns and all-metal pirns. The tare weight of metal pirns and their tendency to bruise fine yarns are disadvantages which counterbalance the advantages of durability and suitability for electrical weft stop-motions.

The all-metal pirn at A, Fig. 36, weighs 37·3 gm. net, while the Northrop type wooden pirn with the spring clips and the steel cover for the electrical weft stop-motion weighs 32·8 gm.; in contrast the paper pirn at C weighs 10·0 gm., but it is unsuitable for nylon yarns on account of compressibility at the slot. When these paper pirns were used on ordinary non-automatic pirning spindles for nylon weft, it was impossible to pull them off the pirning spindle by hand, and a lever had to be used to force them off. This damaged the pirns, reduced pirn-winding efficiency, and soiled the pirner's hands by using the lever. If the same pirns are wound on an automatic machine the problem does not arise there, because there is no spindle, but the nylon pressure partially closes the weft-feeler slot on the pirn; the pirn barrel diameter is thereby decreased and it will be found impossible to push the pirns on to a proper-fitting shuttle tongue. The residual shrinkage of nylon on pirn has been measured to exceed 4%.

Fig. 36.
A—All metal pirn.
B—Northrop pirn.
C—Paper pirn.

A new device has been developed for an automatic pirnwinding machine in which the full pirns are not dropped on to a delivery tray nor delivered by a gravity chute. A portable rack is vertically fitted under the pirning area, and when full, each pirn is mechanically lowered by the base and the tip into the rack. The latter has separate slots for each pirn, and when full, the rack is removed from the machine and placed in containers that hold ten racks; each container is taken to a loom where the battery or the shuttle is replenished in the pirning sequence. With this system the full pirns are not touched by hand in pirnwinding, are not subject to bruising or soilage from gravity delivery chutes, are not bruised against each other because the individual slots keep the pirns apart, and are kept in dustproof containers.

Another automatic pirnwinder packs the full pirns into a horizontal-type pirn box in the correct order, and it can be modified to put the full pirns on pirn boards in the correct pirning sequence. This reduces hand soilage to a minimum because the full pirns are untouched by hand in the pirning room. Further precautions include placing clean sheets of paper between layers of pirns in horizontal boxes.

Automatic pirnwinders do not use a pirning spindle, and the pirn is driven by placing it between two centres, grips, or chucks. The pirn-tip is secured by a free-running centre while the pirn base is securely pressed against a rubber-surfaced driving centre or chuck. Both centres generally have ball races, and it is important to keep the contact surfaces perfectly clean because the pirn will not run true if it is not perfectly centralised. If the rubber surface of the driving chuck is oily, pirn slippage will result and the pirn base will be soiled. If there is dust or "fly" accumulations between the pirn base and the chuck surface, the pirn will run eccentrically with consequent diminution of the diameter of the full pirn. In this connection it is important that the empty pirns are examined for base-cleanliness before fitting them into the pirn battery, and that the battery base itself is cleaned regularly. Some automatic machines have a steel-ball button in the middle of the driving chuck, and this tends to minimise the importance of keeping the rubber surface clean, but the steel button should be cleaned every day.

Fig. 37. Friction marked pirn shown at B.

Soilage from trailing ends is an ever-present problem in weft winding, and in automatic pirnwinding where the starting-tail is trapped between the pirn base and the driving chuck, the latter must be clean or the tail will be soiled and may soil other pirns in the delivery box. Recent patented equipment avoids this by tucking the starting-tail under the bunch when winding starts. The trailing end or finishing-tail is usually kept out of the way by revolving the pirn slowly as the chase former returns to the butt-end position; this wraps the finishing-tail round the pirn base and helps to keep it out of the way.

The fibre feeler-wheel or former which determines the pirn diameter must run freely, and there is a tendency to lubricate the spindle of the wheel; over-lubrication of this spindle is serious, because the fast-running wheel will soil the pirn surface and splash adjacent pirns if it is oiled too freely. The former wheel and the screwed bar on which it traverses longitudinally should be free from dust and "fly." If the fibre wheel is prevented from rotating and from moving forward by some impediment at the screwed bar, the yarn on the pirn will be friction marked as shown at B, Fig. 37. Some of these former-wheels are of black fibre composition, and it is suggested that wheels of white or cream-coloured fibre would be preferable, because they would make soilage on the wheel very obvious.

A German automatic pirnwinding machine is fitted with an automatic

travelling suction cleaner which moves to and fro continually from one end of the machine to the other. The suction cleaner travels on an overhead rail, and the device is specially useful when fibrous yarns are being pirned. The mechanism of some automatic pirnwinders is almost wholly enclosed, and this (a) prevents oil splashing from the mechanism, (b) prevents dust fouling parts which may soil the yarn, and (c) facilitates cleaning. Some of these enclosed pirning heads have internal pressurizing equipment which builds up sufficient air pressure to repel the ingress of "fly" into the enclosed parts. This is very useful when spun yarns are being wound, and avoids a build-up of "fly" in places that are hidden from sight by the casing, etc. A Swiss automatic pirnwinder removes fluff, "fly," and dust by means of special fans, and a suction unit is also incorporated.

Machine Lubrication

The importance of efficient lubrication cannot be overstressed because its neglect will result in poor machine efficiency and high maintenance costs. The dangers of yarn soilage associated with misapplied or excess oiling cannot excuse running with dry bearings, and it is suggested that a competent person should be specially trained for oiling pirning machines. To permit untrained labour to oil these machines is to invite a great deal of soiled yarn through over-lubrication of certain parts, and to sustain breakdowns through non-lubrication of other parts. The modern gear box with the oil sump takes care of most of the spindle and gear lubrication, provided the sump is topped-up and cleaned out at regular intervals. One of the modern automatic machines has small plastic windows at each spindle head to check the level of the sump oil in the gear box, and to note its cleanliness by the degree of clarity.

The lubrication of accessories is also important. Fig. 35 shows black oil running from an over-lubricated guide wheel on a gate-lever tension device; when running at speed this excess oil will be thrown about by centrifugal force, and will splash surrounding yarn and machine parts. The composition wheel shown at Fig. 35 has a small degree of absorption and this is shown by the "spread" on the soiled portion of the wheel. If the wheel is not run soon after lubrication, the excess oil will drip on to the "gates" of the device, and will soil the yarn for quite a long run.

In this connection it is useful to have light-coloured guide wheels which make such over-lubrication obvious, and indicate to the pirner that the wheel needs cleaning. If the wheel is of black bakelite such soilage is not readily apparent, and a soiled wheel may run undetected for long periods. When roll-off supply bobbins are rotated on steel spindles housed in cast-iron frames, the housings should be lubricated as little as possible, because the pirner may soil her hands on the bobbin-spindle extremities. When bobbins run badly or a bobbin spindle begins to squeal, there is a tendency to over-lubricate the housings, and this should be avoided. In general the housings and the spindle extremities are bright with use and require little or no lubrication, but if the spindles have not been running for some time and the room is humid, the bobbin-spindles and housings may be rusty and require a little oil. This rusting problem can be remedied by using bobbin spindles of rustless steel bar.

The choice of suitable lubricant is important, and the machine makers recommend certain lubricants for the various machine parts. The non-drip or non-creep oils (with Parratek additive) should be considered for the outside bearings where oil-splashing is a possibility. The viscosity of these special oils is such that a treacly film or filament of oil may extend from the bearing to the oil-can spout after oiling; this trailing film of oil can soil the yarn and machine parts if it is not checked by pressing a cloth, etc., to the oil-can spout before the oil can is removed from the part lubricated.

Pirn and Pirn-board Soilage

Pirn boards are liable to become dirty with atmospheric dust, and tail-ends of weft yarn frequently accumulate at the base of the pegs. If weft pirns are placed on a dirty pirn board, the starting tails, the pirn bases, and part of the inner pirn-barrel will be soiled. When a soiled empty pirn is pushed on the pirning spindle it inevitably soils the spindle, and the latter will soil succeeding pirns until it is wiped clean. In addition, small portions of free weft-tails which adhere to the empty pirn base may fly off when the pirning spindle starts to revolve, and these small tails may contaminate the yarn on adjacent spindles. When the pirn trays and pegs are of mild steel these are difficult to keep clean if the steel has rusted, because the yarn fibres and dust particles cling to the rough rusty surface of the tray; this may be remedied by a coat of paint.

Plywood pirn trays with painted steel pegs avoid the rust trouble, but dust and tail ends accumulate on the boards unless there is a regular and systematic cleaning of the boards. This may be done by compressed air, suction, or by cleaning the tray with a suitable brush, preferably in a store room. The modern aluminium lightweight pirn board at Fig. 38 is rustless and easy to keep clean because the surfaces have no sharp corners and have a smooth finish. Plywood pirn boards become ragged after several years' use, particularly if the boards are regularly put in a steam cupboard for conditioning crepe weft. Ragged edges trap filament rayon and nylon weft, and if the wear is excessive, the operative's hands may be injured by handling the rough boards.

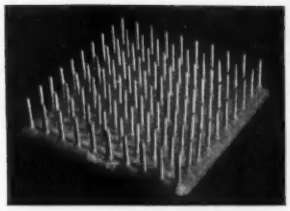

Fig. 38. Aluminium pirn board (James Hustler and Son Ltd)

Another pirn board fault concerns the bottom of the board. If a board is placed on a dirty floor, a dirty shelf, or on an oily pirn board bracket, the bottom of the pirn board will be soiled. Pirn boards are generally stacked on top of one another, and if the boards have no self-stacking side supports the soiled base of one pirn board will soil the pirn tips of the board beneath it on the stack. Soiled pirn tips will soil a great deal of weft yarn and fabric in addition to soiling the weaver's/pirner's hands when she is re-loading the shuttle/spindle. This trouble can be avoided by using transportable tray cabinets with up to five shelves, which can accommodate ten pirn trays with 100 pirns each, i.e. 1,000 pirns per cabinet. These cabinets can be loaded at the pirning machines and taken to the weavers' alleys where the weavers can use the weft as required, and replace empty pirn boards in the cabinet. The cabinets keep the weft and the boards free from dust, and if there are sufficient cabinets, pirn-tray handling can be reduced to a minimum by planning that only the weavers and pirners handle the trays and load the

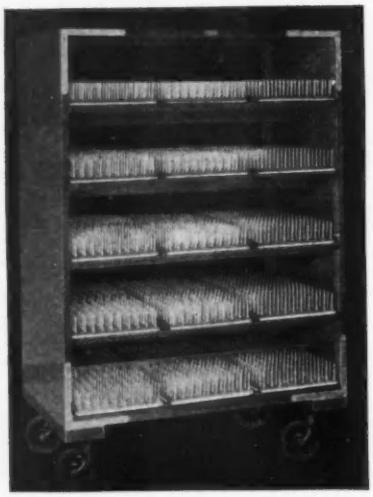

Fig. 39. Pirn-tray cabinet (James Hustler and Son Ltd)

cabinets. An improved cabinet with wheels is shown at Fig. 39. This is a light-weight Dural pirn cabinet specially made to accommodate 30 of the aluminium pirn trays shown at Fig. 38, i.e. 3,000 pirns. The 5 ins. rubber tyred wheels are fitted on swivel castors for maximum manoeuvrability.

A broken pirning-spindle spring may scrape dirt, wood or paper from the inner pirn-tube barrel surface, and apart from damaging the tube or pirn, the small particles of wood or paper may fall on other pirns on a board and soil them. This also leads to a weaving problem, when small particles of wood or paper are ejected from the inner barrel of the tube into the shed when the shuttle is picking from side to side.

Pirn Damage and Renovation

In most mills the weavers have to strip the waste from their own pirns, and a Shirley survey showed that the weavers in one mill spent 10% of their time removing waste from weft pirns. This means that every pirn is subject to a great deal of handling, and may sustain damage if the weavers surreptitiously strip the pirns by cutting off waste with a razor blade, sharp knife, etc. It is inevitable that several pirns fall on the mill floor; if they fall under a loom and become contaminated with oil or grease, they should be thoroughly cleaned before passing into the working cycle.

Unfortunately, some operatives do not clean soiled pirns, and the photograph at Fig. 40 shows a case in point. The pirn was soiled with black grease from the weaving-shed floor, and was carelessly put on the pirn board without cleaning; the board was then taken to the pirnwinding room. The pirns were not inspected, and the pirner put the soiled pirn on the spindle without detecting the soilage. As the weft unwound in the shuttle it eventually trapped and broke as shown in the photograph. This may happen in any mill, and where clean work is essential, every pirn should be inspected in the pirning room before being issued to the pirner. In some cases it is very difficult to detect pirn soilage, particularly if the pirn is black in colour. The photograph at Fig. 41 shows a black welsh-hat pirn soiled with black grease on the black-coloured built-up portion. The pirn base has been painted white round the grease spots in order to show up the soilage, but this was difficult to detect on the black base and was found after the fabric had been soiled. It would assist the detection of pirn soilage if the pirns were of a light colour, but if white weft is wound on white pirns, weavers cannot see when a pirn is nearly spent.

The modern trend to re-deploy labour so that weavers do not spend time stripping pirns, has necessitated the employment of unskilled labour for pirn stripping on swifts, etc., and these workers do not treat pirns as carefully as weavers who realise that a faulty pirn may return to their looms. Where it is economically possible to install pirn-stripping machines the damage to pirns is minimised, but care should be taken to keep the pirn-stripping machines clean. If the pirns to be stripped are tipped into a large hopper, the surface area of the latter is so great that atmospheric dust may fall into the hopper and soil the pirns, while dust

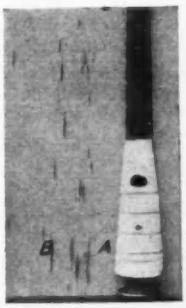

Fig. 41 (above). A—Grease soiled pirn base. B—Soiled fabric woven with weft from A

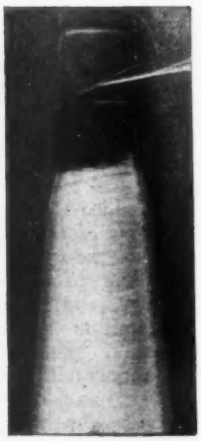

Fig. 40 (right). Pirn soiled by black grease

Fig. 42. Knotting machine with soiled trigger

and debris, etc., may be tipped into the hopper from the pirn boards or skeps. The travelling belts on some pirn-stripping machines become soiled in time, and should be cleaned periodically. Compressed air is not always clean, and if the pirn-stripping machines use compressed air, the pumps should be overhauled and cleaned periodically.

It is quite commonplace to see pirn-stripping machine operatives with very dirty hands, and they contend that it is impossible to keep their hands clean on this work. The acceptance of such a contention is the acceptance of unclean pirns, and ae clean work cannot be ensured from dirty pirns it is necessary to continus cleaning the stripping machine working parts until the pirns are reasonably clean. The machine operatives should be encouraged to keep their hands clean, and hand-cleaning cloths should be provided without stint. Polishing and buffing pirns on a revolving spindle at a special machine renovates

(*continued on page 414*)

Worsted Suiting and Costume, etc., Cloths

Colour, design and quality are the three outstanding features of the patterns reproduced on the facing page. They are a representative selection from the range manufactured by Lee and Foster Ltd., Legrams Mills, Bradford 7. Brief details are as follows:

(1) W.7251. All worsted with "Lurex" decoration. This attractive cloth in a lovely shade of blue has the centre of the novel weave emphasised with the bright spot (13½ ozs.).

(2) W.7259. A really smart all worsted suiting in a well-balanced combination of blue/grey and black (15½ ozs.).

(3) W.7244. A distinctive handle and surface texture are the main features in this all worsted dress cloth (13½ ozs.).

(4) W.7257. Novel weave in a subdued lustre all worsted cloth in a dark double-toned blue shade (15½ ozs.).

(5) W.7258. Another high quality all worsted dress cloth in a small, neat weave and a bright shade light blue/green (13½ ozs.).

(6) W.7055. All worsted fancy weave in a navy blue shade (14½ ozs.).

Worsted Suiting
and
Costume, etc. Cloths
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2
3
4
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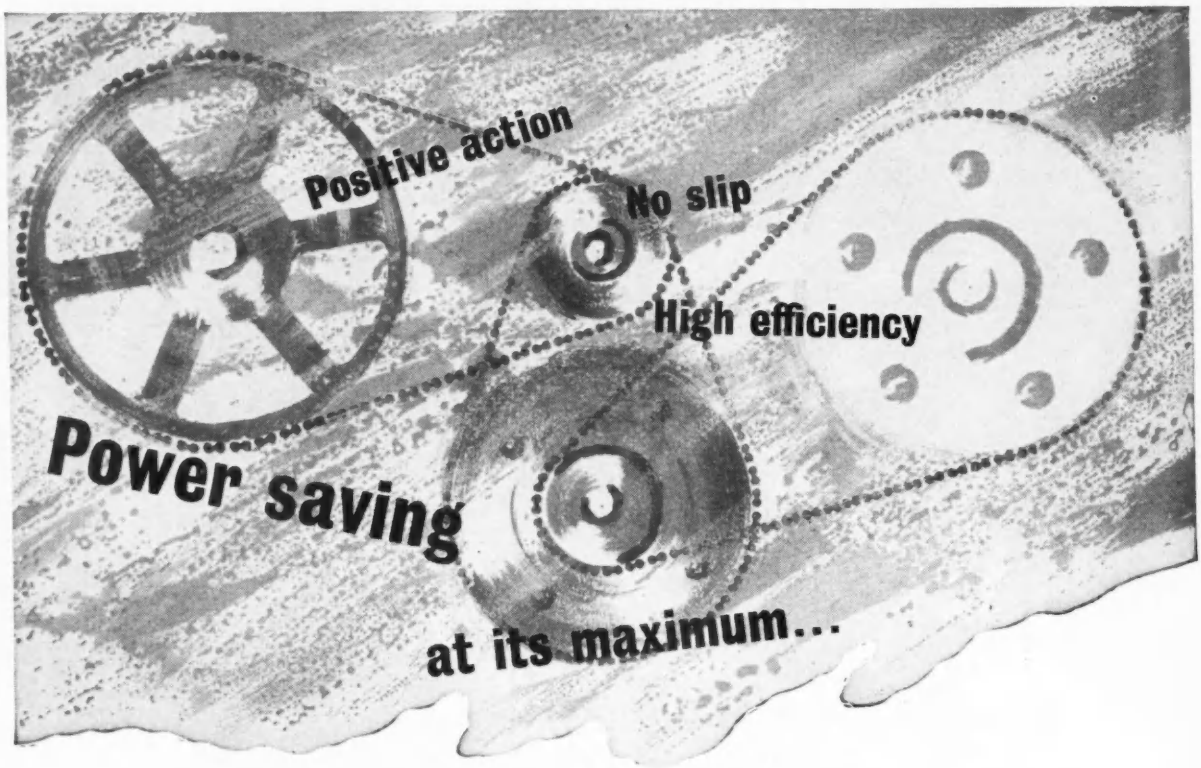

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- The roller chain drive is positive, which means no slip-loss between driving and driven shafts, thus eliminating one appreciable source of power wastage.
- The design of the chain drive, and the materials of which it is constructed, ensure the minimum of friction—each chain joint constituting a precision bearing with hardened steel surfaces.
- In gearing with the chain wheels, the transmission "pull" is taken over a large number of teeth, which share the load.
- The chain rollers eliminate sliding contact between chain and wheel teeth.

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Renold chain drives have a certified transmission efficiency of 98.5 per cent, unequalled by alternative forms of "off the shelf" power transmission.

Any power cost increases make efficiency matter more than ever. Such extra charges on production can be offset — probably more than offset — by eliminating unnecessary wastage in transmission. There is absolutely no need to pay for power than goes in friction and slip — Renold chain drives can save up to one unit (or £1) in every ten. Remember too that this goes on year after year ; a real investment.

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New Type Air Conditioning System in Dutch Textile Mills

By J. GRINDROD, B.A.(COM.)

An Econ-O-Mist installation at the rayon weaving mills of K.S.W. at Nijverdal, Holland

CLAIMED to possess a number of advantages over the conventional saturation systems of air conditioning, a new type supersaturation system has been installed in a number of Dutch textile mills including installations at the large rayon concern A.K.U. (Enkalon) plants and at the rayon weaving mills of K.S.W. at Nijverdal. Known as the Econ-O-Mist system, the new air conditioning plant has been developed by Bronswerk N.V., Amersfoort, Holland, on the basis that the air can obtain more water than is expressed by 100% R.H.

Under such conditions, part of the moisture content of the air is not present as vapour, but in the form of "atomised" water. If this air is brought into the room to be conditioned, it mixes with the warmer air of the room, causing the water droplets to vaporise and increasing the temperature of the conveyed air. The cooling effect is thus increased because heat is absorbed during the vaporising of the water droplets. Where a high degree of relative humidity is desired, as in spinning and weaving sheds, this method makes possible a much greater cooling effect than can be obtained with a normal washer installation and loom efficiency is increased accordingly.

It has been estimated that, where before the installation of the new system the efficiency of non-automatic looms and modern automatic looms was 65 and 75–80% respectively, based on fibre rupture, with the Econ-O-Mist system in use, the efficiency was stepped up, it is said, to 75–80 and 90–95% respectively.

The efficient operation of the supersaturation system itself depends on the degree of fineness of the atomised water and the amount of supersaturation obtainable with reasonably efficient operation. As regards the degree of fineness of the atomised water, the droplets should be suspended in the air like fine airborne dust particles, while the amount of supersaturation depends on how much fine water mist is formed per pound of air. As more water is added to each pound of dry air so is the cooling capacity increased and the quantity of air in the system reduced.

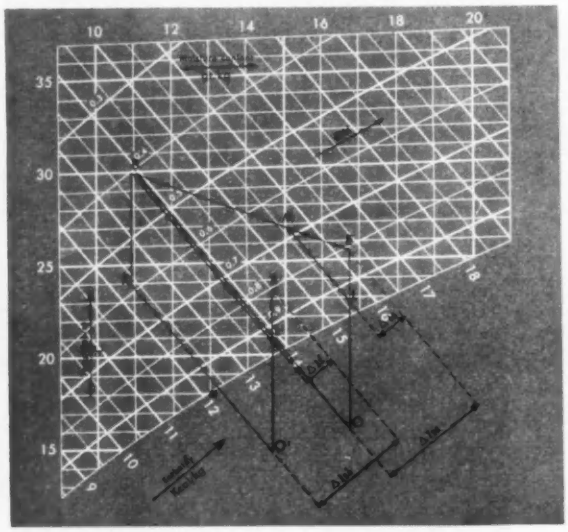
Incorporated in the new Dutch system is a special atomising fan or mist generator which gives very high mist density combined with a high ratio of supersaturation (weight of water absorbed by the air per pound of water sprayed into the system) and a good air flow efficiency. In cases where the wet-bulb temperature obtained with this system would be too high, a special modification permits reduction of the room temperature. As a result, the air capacity of the system is normally only one-half to one-third of those installations working on conventional lines. For rooms with high relative humidities, even a ratio as low as 1 : 10 is possible, which means that only one-tenth of the air capacity is required.

Capable of being used wherever a fixed relative humidity must be maintained the Econ-O-Mist supersaturation systems normally require that the dewpoint inside the building be equal to or higher than the wet-bulb temperature outside. In certain cases, however, the systems may also be used successfully even where the dewpoint inside is actually lower than the wet-bulb temperature outside the building.

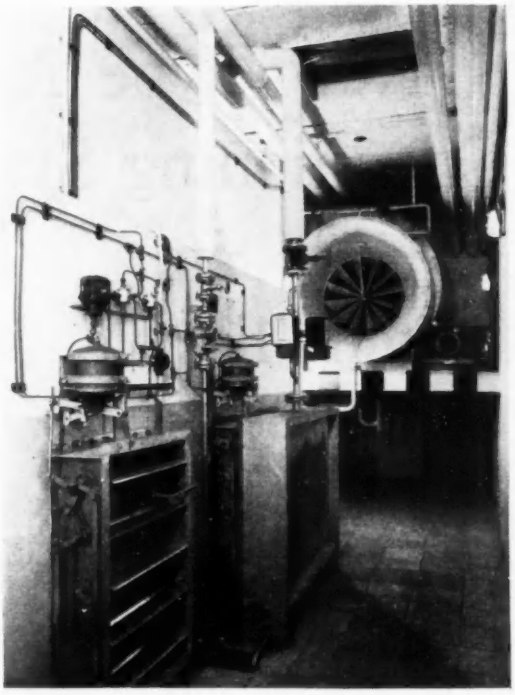
Entirely free from drip so that there is no risk of damage to the product being manufactured, the systems are designed with fully automatic control of the continuous all-the-year-round type. Corrosion resistant materials such as aluminium, stainless steel and nylon are used for the atomising fan and ducting.

The practical application of the system depends on the relation between the required conditions of the air indoors and the corresponding conditions outside and two examples can be quoted of the relative efficiency of normal saturating and Econ-O-Mist supersaturating systems. For this purpose a psychrometric chart is used on which the various conditions and efficiencies are plotted. Presupposing outside conditions of 30°C.; 40% R.H. and required inside conditions of 25·6°C.; 80% R.H., the lines in the chart show how the saturation and supersaturation systems compare.

With the saturation system it is not possible to work with fresh air exclusively and a percentage of recirculated air is, therefore, necessary. Point B represents the outside conditions and point E the required inside



(above) Comparison between a saturating and an Econ-O-Mist supersaturating system by means of a psychrometric chart



(right) Fans, damper and control room for one of the Econ-O-Mist installations

condition and on the line BE there lies a point representing the mixed condition. To determine this point a line is dropped vertically downward from E to the maximum obtainable R.H. of the air after passing through an ordinary spray chamber 94% R.H. at point L. By drawing a line from L toward the line BE, parallel to the lines of constant enthalpy an intersection of BE is made at M and the ratio of the lengths BM: ME indicates the proportion of recirculated air to outside air. Mixed air in these proportions, becoming moistened in the washer to 94% R.H. (ML), will, by absorption of heat from the room (LE), produce the required condition E and the quantity of heat per kg. of air $\triangle$ls, according to the chart is 16·3 — 15·65 = 0·65 kcal/kg. Assuming a total heat development of 100,000 kcal/hr. the required quantity of air will be 100,000 ÷ 0·65 = 154,000 kg./hr.

With the supersaturation installation, using a degree of supersaturation of 1·7 grams per kg. of air, only outside air is used and supersaturation proceeds according to line BO. With 1·7 gr./kg. supersaturation, point O is found, by extending the vertical line from point E, where the air contains 16·65 grams of water per kg. By absorbing heat from the room, point E is obtained, representing the desired final air condition. Under this system, the quantity of heat absorbed will be: $\triangle$lss = 16·3 — 13·9 = 2·4 kcal/kg. of air and assuming a total heat development of 100,000 kcal/hr., the quantity of air required would be 100,000 ÷ 2·4 = 41,700 kg./hr., or 3·7 times less than for the saturation system. In the case of the second example depicted on the chart, the effect of pre-cooling is demonstrated, the outside conditions being the same as in the first example, but the required inside conditions being 23·5°C.; 80% R.H. With the saturation installation, outside air only is moistened in a washer to 94% R.H. (BL^1), whereupon heat can be absorbed until the required condition E′ is attained. Heat absorbed per kg. of air ($\triangle$l's) = 14·5 — 13·9 = 0·6 kcal, and, for 100,000 kcal/hr., 167,000 kg./hr. air is required.

Assuming a degree of supersaturation of 1·4 gr./kg. of air, the extent of pre-cooling can be determined by dropping a line vertically from the required condition E′ and by plotting horizontally from this line 1·4 gr./kg. to the left to cut the saturation line at "a." From "a" a line of constant enthalpy will cut the constant moisture line at O′, which is the point of supersaturation, and at point K it will cut a line drawn vertically beneath point B (at 24°C.; 58% R.H.). This drop from 30°C. to 24°C. (6°C.) represents the amount of air pre-cooling and the heat absorbed by 1 kg. of air ($\triangle$l'ss) will be as follows: $\triangle$l'ss = 14·5 — 12·35 = 2·15 kcal/kg. For a cooling capacity of 100,000 kcal/hr., 100,000 ÷ 2·15 = 46,500 kg. per hour of air is needed or 3·6 times less than for a saturation plant.

Among other advantages claimed for the Econ-O-Mist supersaturation system of air conditioning are the absence of draughts, since relatively few changes of air are necessary even in rooms with high heat concentrations such as weaving and spinning mills; the low initial cost and low power consuming equipment occupies very little space; and installations can be carried out in existing factories with a minimum of structural alterations and there are no large air ducts to obstruct light.

For supersaturation, plants with pre-cooling water at relatively high temperatures can be applied and water already used for other cooling or rinsing processes may be used. The power consumption of a supersaturation system with mist generators amounts to about one half of that needed for a saturation system because no washer is required, the air quantity is considerably less and the friction loss but slightly higher.

Compact Heavy Duty Cone or Cheese Winder

IMPORTANT innovations have been incorporated in the new heavy duty cone or cheese winder recently introduced by Thomas Holt Ltd., Rochdale and Darwen. This machine, the Model PU, produces a package with a special type of precise wind. Instead of the normal two diamond wind, the package has five diamonds round the circumference, this considerably reducing the length of yarn between the intersection of each diamond which can be displaced. The importance of this is realised in the stability of the package, and the elimination of end collapsing during transportation.

The winding speed can be up to 450 yds./min. and the package arm is weighted as well as being under the control of an oil damper to prevent vibration of package. This new type of precise wind is maintained by back driving the traverse guide from the winding spindle, whilst the winding spindle itself is motivated by contact with a plain steel drum. The package spindle and traverse are positively linked together at all speeds and conditions, thus guaranteeing a constant wind. A ½ h.p. motor drives the winding drum through a series of gears and the requisite change places are installed for speed regulation. Lubrication of all gearing is by the splash method enclosed in the headstock, and all bearings are the sealed type.

The thread guide has tungsten carbide inserts and points of contact with the yarn can be protected by ceramics. If an end break occurs, the Model PU is automatically stopped by means of a micro-switch connected to the driving motor. A detector bar, over which the yarn passes, is fitted for the purpose of locating the micro-switch when failure occurs.

To eliminate any initial slippage between drum and package, a special flat spring operating against the front of the spindle arm gives extra pressure for a short period at the beginning of the wind. An arrangement is also fitted whereby the package spindle can be positively driven if required. The package can have either a paper or a wooden centre, cones or cheeses, and an expanding device is installed to secure any further slippage due to paper centres being employed. The normal taper angle obtained on a cone is 3° 30′ and this angle can be changed quickly and easily to obtain parallel cheese package. A quick release mechanism is employed to facilitate doffing, even though the package spindle is rigidly supported at each end. A standard tension disc is employed to maintain individual yarn tension and a clearing arrangement can be applied if necessary.

The machine is designed for use with all types of heavy yarn spun from cotton, including carpet yarn, and is also suitable for rayon, jute and wool mixtures. A package of 14 ins. maximum dia. is produced with traverses of 8, 10, or 12 ins. The weight of each package varies, of course, with the type of yarn used but for example, with 8 lbs. jute, packages weighing 24 lbs., 30 lbs. and 36 lbs. are obtained with 8, 10 and 12 ins. traverses respectively. Any type of supply package can be used and the machine is suitable for assembly winding and winding from hank. Each unit takes up only 29 ins. by 20 ins. of floor space, and is only 3 ft. 9 ins. high.

Close-up showing broken thread control and oil-filled dash-pot arrangement for damping vibration

The Model PU producing cones for the tufted carpet trade

Single and Folded Yarns

Consideration of the amount and direction of twist, breaking load and extension, types of twisting machinery, yarn finishing operations, reeling (lea and cross), winding for warping and knitting, and yarn conditioning

By N. ROPER, B.SC.(ECON.), A.T.I.

SINGLE yarns, i.e., those direct from the spinning frame, are used considerably for weft purposes and occasionally for warp yarns and machine knitting. Generally speaking, however, worsted yarns are twisted or folded together to achieve certain varying results in the finished material. Twisting, or doubling, is carried out for the following reasons.

(1) To obtain a greater measure of strength than is possible in a single yarn of equivalent count.

(2) To stabilise strength. The tensile strength of a single worsted yarn is extremely variable but the variation is much less in the equivalent folded thread.

(3) To promote increased durability in the woven or knitted fabric.

(4) To impart desirable characteristics to the thread. The handle, lustre, smoothness, bulkiness, etc., of a yarn may be adjusted within fairly wide limits by suitable manipulation of the single and folding twists.

(5) To produce novelty effects by twisting together different colours, materials, counts and lengths.

Amount and Direction of Twist

The amount and direction of twist to insert into a folded worsted thread are factors of first importance and there are no mathematical formulae which can be applied rigidly to all types and counts of worsted materials. The quality of the material, the average fibre length and variability of fibre length, the strength desired in the yarn, the effect desired, the handle, appearance and use of the ultimate fabric all have a bearing on the turns per inch inserted. Generally speaking, the twist required varies in an inverse ratio with fibre length and softness and handle, and varies directly with quality and strength. Material well spun requires less twist.

The direction of twist, i.e., whether the spindles inserting the twist revolve clockwise or anti-clockwise, is important since in the process of uniting the yarns, the twist in each of the respective singles can be either augmented or diminished by imposing the compound twist in the opposite direction or similar direction to the spinning twist. The normal direction of spindle revolution in worsted spinning is clockwise whereas in twisting the revolution is anti-clockwise, but in different districts, different terms are employed to describe the direction of twist, e.g. clockwise, reverse, left, normal, open-band, etc. This practice causes confusion and it is much simpler to describe the direction of twist in the manner recommended by the Textile Institute, namely, "S"-twist and "Z"-twist (Fig. 1). Thus, if the twist spirals conform to the slope of the letter "S" the term "S"-twist shall be applied and where the slope of the twist spiral conforms to that of the letter "Z" the term "Z"-twist shall be applied. The normal twist inserted in worsted spinning is therefore "Z"-twist whereas for doubling the direction is "S."

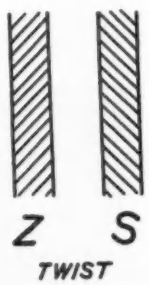


Fig. 1. "S" twist: clockwise "Z" twist: anti-clockwise

If 15 turns "Z" are inserted into each of two single yarns which are then combined with 12 turns "S," the twist of the single in the compound will be in each yarn three turns "Z." If 15 turns "S" are inserted into the folded thread the residual twist in the singles will be zero. If 20 turns "S" are inserted into the compound thread the whole of the spinning twist will be removed and 5 turns added in the reverse direction to each yarn. Thus, in the last instance, the twist in the single and in the compound thread will be in the same direction.

When the single and folding twists are in reverse directions the term employed is "twist against twist." The term "twist on twist" is the description used when the single and folding twists are in the same direction; the effect of this latter process is that the twist in the singles is augmented by the whole of the folding twist and the final yarn is lean and harsh with a marked tendency to snarl, i.e., to form loops which twist together and give an altogether untidy appearance to the yarn and fabric. It is clear, therefore, that by the simple operation of folding or twisting yarns together, the single twist can be reduced to zero, or developed in either direction. Great use is made of this fact in securing a wide range of yarns to accommodate the requirements of worsted and hosiery cloth makers.

Breaking load and extension increase up to a limited point with increased amounts of twist given to the yarn; beyond a certain point, however, further amounts of twist cease to produce an increase in strength and elongation. It therefore behoves the manufacturer to ascertain as correctly as possible the minimum amount of twist that will yield the best results in stretch and strain before the yarn fractures. Further, the characteristics of some cloths are such that they do not require to be manufactured from yarns which contain the maximum amount of twist and strength and in such cases it is possible to effect a saving in yarn cost since production varies inversely with twist.

The actual number of turns per inch to insert into a yarn is a matter of some controversy and all spinners have differing ideas on the subject. In the cotton industry considerable use is made of "twist factors"; thus, the turns per inch equals the square root of the count multiplied by the twist factor. Twist factors for worsted yarns have been suggested as 2·5 for hard twist, 2·2 warp twist, 1·6 for weft and 1·2 for hosiery. A formula the author has found useful for many years in spinning botany and fine cross-bred materials in the count range 20s to 48s is as follows:—

$$\frac{\text{Counts}}{3} + 2 = \text{Warp twist.}$$

$$\frac{\text{Counts}}{3} + 1 = \text{Weft twist.}$$

$$\frac{\text{Counts}}{3} = \text{Hosiery twist.}$$

If t = single twist,
and T = folding twist, then

(a) $t \times \frac{8}{5} = T$ for a balanced two-fold.
$t \times \frac{2}{3} = T$ for a balanced three-fold.
$t \times 4/5 = T$ for a balanced four-fold.

(b) $\frac{t}{1} = T$ = straight fibre two-fold twist.

(c) $t + 2 = T$ = gaberdine twist.

(d) $t \times 1{\cdot}5 = T$ = crepe or grandrelle twist.

The square or straight fibre twist is the normal warp arrangement and results in a lean, smooth, strong thread which, when woven, displays the design of the fabric to its fullest advantage. Weft yarns have a similar construction but the absolute number of turns inserted will be 10% less. These yarns have a tendency to snarl in the direction of the folding twist.

For hand and machine knitting yarns the dead or balanced twist arrangement is the best. In this case the sum of the residual twists in the singles after folding is equal in number and opposite in direction to the folding twist. A typical yarn is 2/16s, spinning twist 6 "Z" and folding 4 turns "S." Thus the folding twist removes 4 turns from each of the singles leaving a combined residual twist of 2 + 2 = 4 "Z" which is balanced by the 4 folding turns in the "S" direction. The final yarn is round, full and soft handling and shows no tendency to snarl or form loops in either direction. In order to avoid the fault of "spirality" in knitted fabrics, the balanced twist must be employed. A grandrelle or colour twist yarn consists of a compound yarn composed of contrasting colours. The number of turns per inch is very high in order to produce the characteristic and attractive "spot" effect.

Twisting Machinery

Broadly speaking, twisting machines can be sub-divided into two chief types (*a*) the dolly roller twister and (*b*) the "universal" twister. The insertion of twist and winding on to the package on both types may be of the flyer, cap or ring principle, the latter being the most popular type owing to its successful adaption for larger packages. Probably the most important feature in a good twisting frame is the "trap motion" for preventing any yarn being wound on to the package minus one or more of the threads required in the folded yarn.

The dolly roller twister, illustrated in Fig. 2, has a vertical leather covered delivery roller which is positively driven and connected to a pivoted framework. It is essentially used for twisting two single yarns together in the opposite direction to the twist in the single yarn, with approximately the same number of turns. There are no detectors for each individual thread, so that as the stoppage of delivery depends upon the inability of the remaining thread to keep the dolly roller in running position, this machine is not recommended for twist on twist, or for more than two-fold work. When one of the ends breaks or runs out the twist is removed from the remaining end which also breaks. This releases the tension on the pivoted framework, which falls forward, thereby disengaging the dolly roller drive and delivery ceases. The spindles rotate continuously and all knots tied are double knots.

The outstanding feature of the universal twisting frame, illustrated in Fig. 3, is the combined roller and spindle stop motion, which operates instantaneously on breakage of any one single thread. This type of machine covers a very extensive field, twisting yarns two to six fold and more, over a very wide range of counts in worsted, woollen, cotton, silk, jute, flax and other fibres, for the production of hosiery and hand-knitting yarns, carpet and rug wool yarns, heavy woollen and hair yarns for press cloths, bagging, coarse woven fabrics, beltings, packings, and similar type goods where multi-fold yarns are necessary.

Two or three lines of horizontal steel rollers are employed, the bottom line running the whole length of the frame. Small width press rollers fitted in a swing cradle form the second and third lines. Each individual end passes through a detector wire in the detecting box. This latter has a catch connection to keep the swing cradle in its vertical position, during which yarn delivery takes place. While the end is running the tension holds the detector out of contact with an oscillating detector bar underneath. When a single thread breaks or a bobbin empties in the creel, the corresponding

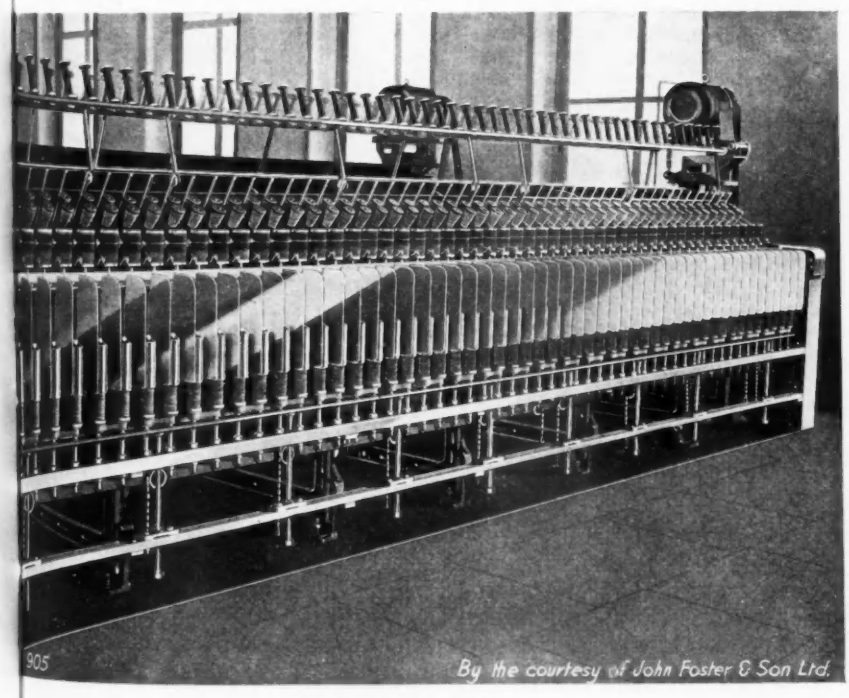


Fig. 2. Dolly roller twister

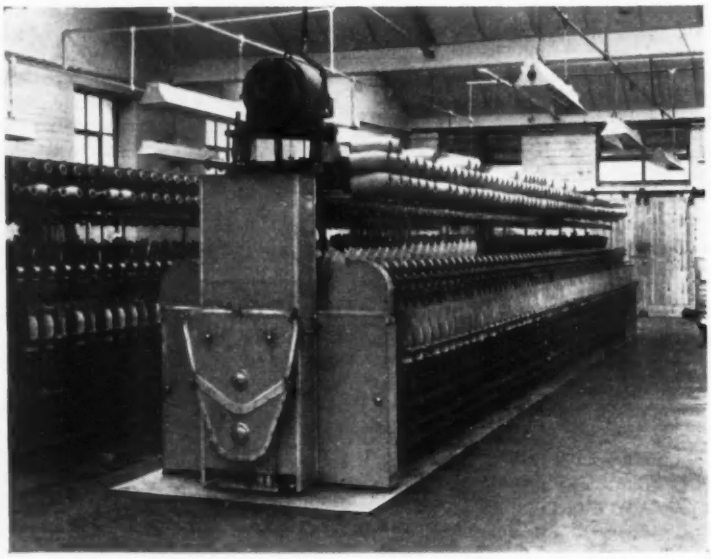


Fig. 3. Universal ring twister (courtesy, Prince-Smith and Stells Ltd.)

detector drops making contact with the oscillating bar and tipping the detector box, which releases the catch, and the swing cradle falls forward, stopping delivery. A projection at the bottom of the swing cradle also operates a mechanism for starting and stopping the spindles.

This type of twisting frame is a great convenience to the attendant, as the trailing end of the broken thread does not pass through the rollers, but will remain near to the detector, where it can be easily picked up and re-tied. The yarn produced has no bunch knots and is therefore of a very high standard. Modern ring twisters, such as the Boyd patent stop motion belt-driven twister, employ a single, endless leather belt which drives all the spindles. On the Boyd frame the belt is automatically tensioned and when the stop motion operates, the belt is taken away from the spindle, and not the spindle from the belt; this ensures that the spindle remains always central to the ring.

Assembly Winding

The assembly winding of yarns on to cheese previous to twisting has been practised for many years in the cotton and Continental worsted industries, but is a comparatively rare procedure in the English worsted industry, despite its many advantages. The advantages of assembling the component yarns side by side on a cheese before twisting are as follows:—

(1) All knots are tied in the single yarn.
(2) An even tension may be given to each thread resulting in a more regular twist. There is a great advantage in this connection when two yarns of a different nature such as wool and silk or rayon are being folded together.
(3) An operative can mind more twisting spindles, due to less frequent creeling required.
(4) A cheaper and more simple twisting frame may be used.

There are disadvantages, of course, in the cost of the extra winding process but this is more than offset by the increased twisting productivity; and twisting is a much more expensive process than winding. An individual stop motion for each thread as well as an apparatus to clear the single yarn of all slubs, neps, etc., are usually fitted to the assembly winding frames. Fig. 4 shows a universal ring twisting frame with a creel fitted to take large cheese packages.

Yarn Finishing Operations

Although the structure of a yarn is completed in the twisting process, it often happens that the twisting packages are not suitable to be transported from one factory to another and processes are therefore introduced after twisting, to put the yarn into such a form that

(1) It can be packed into a small space with little cost.
(2) There is as little superfluous tare as possible.
(3) A large supply package is produced.
(4) The yarn is in the most suitable form for the succeeding process or processes.

Yarn can be used for a variety of purposes and the end-use determines the yarn finishing routine. Thus weaving yarns are supplied in the form of warper's beams, cheeses and cones if for warp, and in the form of spools, pirns or cones if for weft. At one time the preparation of a warp was considered a spinning process, but nowadays, manufacturers prefer to make their own warps so that on cone is the most popular type of delivery. Large cones holding 3 lbs. of yarn are

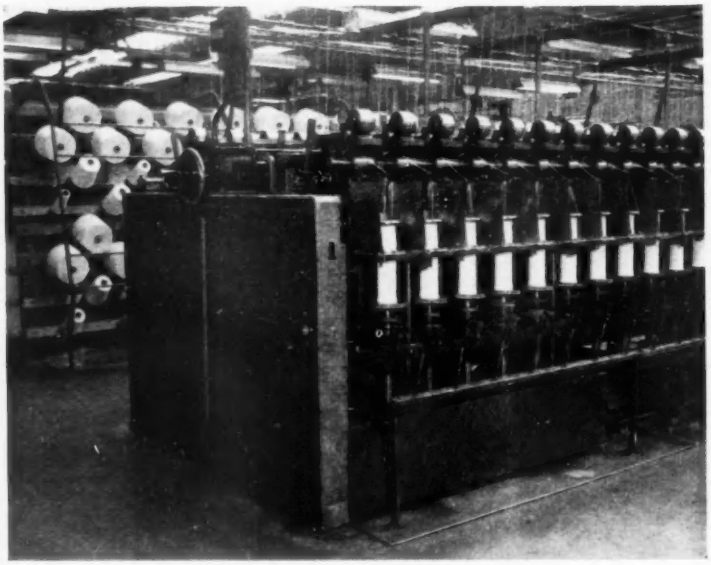


Fig. 4. Universal ring twister with creel designed to accommodate large cheeses

suitable for high speed warping and for supplying automatic pirn winding machines. Yarn can be spun or twisted directly on to spool or pirn for weft but winding the yarn on to pirn increases the weight of the package, and thereby its running time in the loom, by about one-third.

When the yarn is for export it is often placed on light paper tubes or cops which effects economy of carriage and obviates return of tare. For the hosiery trade yarns are usually delivered on cone. If wet treatment such as dyeing or bleaching is involved the yarn is usually wound into the form of a hank or skein which may afterwards be re-wound on to cone or on to large bottle bobbins. Hand knitting yarns are delivered in hank form or, alternatively, may be wound into small balls or on cards.

Reeling or Hanking

The reeling operation by means of which yarn is placed into long measured lengths in hank form serves many useful purposes. It enables the counts to be more directly determined than is possible in the spinning routine and it facilitates transport owing to the absence of tare. Further, it puts yarn into suitable form for minute inspection, conditioning, scouring, bleaching and dyeing, and there is the advantage that the reeled hanks may be easily re-wound on to pirns, cheeses and cones without waste.

In the worsted industry the term hank is used in two ways, namely, to indicate the counts standard of length which is 560 yds. or as a term applied to any length of yarn which has been put into ring form on a reel or swift. In fact the term hank should be used to refer to the yarn reeled to the count standard or multiples of that standard and the term skein should be reserved for yarn reeled to a definite weight independent of any counts standard.

The standard skein dimensions employed in this country are $1\frac{1}{2}$ and 2 yds. circum. and 1 or 2 ozs. in weight, the counts regulating the exact length. When a spinner accepts an order in hank, he is responsible for delivering correct length as well as correct weight in every hank. The reeling machine must therefore possess a suitable knock-off motion which stops the reel immediately the calculated length of yarn has been formed into a hank. In addition, means must be adopted to ensure that successive wraps of yarn are spread uniformly over the surface of the reel and not heaped up into ridges, of which the outer layers would have a larger circumference than the inner. For this purpose it is necessary that the yarn should traverse across the face of the reel, and two entirely different methods have been adopted for this purpose. The pitch of the reel is determined by the size of the supply bobbin. If the hanks were allowed to touch one another on the reel they would get inextricably entangled, and therefore a space must always be left between them; this limits the traverse to $\frac{1}{2}$ in. less than the pitch.

The practice of "lea reeling" whereby the hank is divided into seven wraps or leas, seems to be a curious relic of hand-winding days, when the only method of obtaining a traverse was to lift the thread from one guide to another. In modern reels the process is, of course, automatic, and though it is easier to make a slow and steady traverse motion, the intermittent one is preferred, because in tying up the loose threads of the hank it is customary to interlace the lease band, so that each lea is separated from its neighbours. The whole hank is therefore much less likely to get entangled in subsequent wet treatment.

In the silk trade lea reeling is still practised but in the worsted industry "cross-reeling" is much more general. In cross-reeled hanks the guide is made to traverse quickly to and fro, about one traverse for every three-quarter revolution of the reel, so that each successive thread of yarn must cross the one laid on before it. No two threads lie parallel, and there is less fear of them getting entangled.

Winding

The winding of worsted yarns is performed for a variety of reasons. The main purpose is to provide the longest possible length of yarn on the package and at the same time present the yarn for the particular operation in the best possible form. Even if it were feasible to produce big enough spinning and twisting packages, it might still not be desirable to eliminate the winding process which also performs the functions of conditioning and yarn clearing. The importance of the latter process is not always fully realised; but it is much cheaper to have one end broken down when removing a fault than to have a large number of ends stopped as occurs in warping and weaving. The removal of a fault in the piece is also a costly procedure and much better performed in the winding process where possible. The yarn may be required to be put on to—

(1) Cheeses for warping in the ordinary type of creel or for delivery to the manufacturer in that form.
(2) Cones for knitting purposes or for magazine creel warping or for providing the supply package for pirn winding.
(3) Assembly winding of single yarns on to cheese for twisting.

In winding for warping, the size of cheese will be dependent on the size of the order but, in general, cheeses are not made above $1\frac{1}{2}$ lb., unless specially requested. Creel construction also limits the size of the cheese in many cases. It is also a consideration that with unrolling supply, too large a cheese imposes excessive tension on the yarn, and leads to trouble where large and small cheeses are used alongside each other when re-creeling in warping becomes necessary. Where magazine creels are used for warping a slow taper cone is necessary. By using a cone of this description, the maximum length of yarn per package can be obtained and, due to the high yarn speed in unwinding, there is produced an adequate yarn balloon to clear the nose of the cone.

Cones for knitting need to have a convex base and a relatively sharp taper in order to reduce yarn tension whilst the cone is relatively big. Warping cones with a slow taper are sometimes used for twisting, the yarn being drawn overend. In this case suitable drag rods have to be provided and the results are not always satisfactory. In general, cheeses are better packages from which to twist since the cheese can be pulled round and tension difficulties associated with the cone supply package are thereby avoided. A slow taper cone is also used for re-winding weft.

Yarn conditioning is an essential part of winding since the regain allowance for worsted yarns is $18\frac{1}{4}\%$. Yarn leaving the spinning or twisting process usually contains about 12% moisture and the additional moisture required is added in winding, sometimes in warping or reeling. The moisture is added by passing the yarn over a roller which is rotating in a trough of water kept at a constant level. The amount of water added can be adjusted by altering the speed of the roller or the height of the water level in the tank. Certain materials pick up the moisture on the conditioning roller only with difficulty. When this happens, the usual practice is to add a surface tension reducing agent such as soap or Teepol to the liquid when the water penetrates the fibres more easily. The use of water alone is however strongly recommended since this lessens the risk of mildew.

There are many different types of textile winding machines which can, generally speaking, be divided into two categories: precision winders and drum winders. A precision winding machine is one in which the package is fixed to a driven spindle and as the diameter of the package increases, the yarn speed increases also, the speed in revolutions of the spindle being constant. A drum winder gets its name from the fact that the package is driven by frictional contact between the surface of the package and a driving drum. On this type of machine, the yarn speed remains constant, because the surface of the package is in contact with the surface of a drum revolving at a uniform rate of speed.

Figs. 5 and 6 show two different methods of traversing the yarn on drum winders:—

(1) By means of a reciprocating guide, where the drum is used only to drive the package and a separate cam driven reciprocating thread guide is used to lay the yarn on the surface of the package. On older type machines a heavy cam was used, which transmitted the reciprocating motion via a traverse rod and guides, the rod extending the full length of the machine. The nature of this arrangement limited the traverse speed and hence the winding speed and attempts to run the machine faster resulted in heavy wear and tear and high maintenance costs. The development from this was the use of separate cams for each winding spindle so that now each driving drum and spindle is really a separate unit. The cams are not all set in alignment but are run out of phase with each other in order to distribute the load and reduce noise and vibration. The cams are of lighter construction and have to do less work; hence, replacement costs are lower. Further, any fault is confined to a single end and does not affect all the frame.

(2) By means of a rotary traverse, where the drum drives the package, and the intersecting helical groove, an integral part of the drum, guides the yarn. This is the method employed on the Universal Roto-Coner, and is an improvement on the old split-drum type.

The Abbot travelling spindle winder, made by Thomas Holt Ltd., has made many of the operations formerly carried out by hand into automatic processes. It is an ingenious machine. Instead of the operator having to walk from spindle to spindle, she remains seated and the spindles move past her. She merely picks up the package to be wound, finds the loose end, places it in the magazine and puts the end into the suction circle. The automatic knotting head finds the end on the winding package and the automatic knotter ties

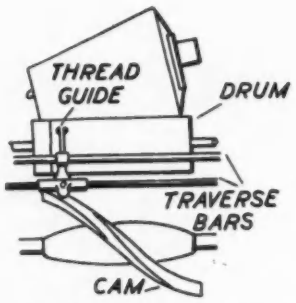


Fig. 5. Drum winder, reciprocating thread guide type

a fisherman's knot. The rate at which the spindles move past the operator is governed by the speed at which she can feed the cops to the magazine. Winding speeds are limited by the rate at which the yarn can be drawn off the supply bobbin, and the winder is made of sufficient length according to the

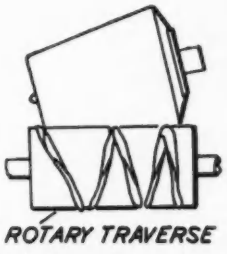


Fig. 6. Drum winder, rotary traverse type

type of yarn and package size. The operator, in addition to feeding the supply package only has to take off the full cone which is placed directly into skeps or trucks. If any ends break down, the partly emptied bobbins are doffed and passed along a conveyor with the empty tubes. The breakage or running out of an end automatically lifts the cheese or cone out of contact with the winding drum.

New Developments in Cloth Construction

Reproduced slightly larger than the original patterns, the cloths on the facing page are a selection from some of the latest development fabrics by Courtaulds Ltd. Brief particulars of weave, warp and weft, are as follows:

Top row (left): Black, plain weave evening dress fabric with gold printed stars. Warp—200 (38) den. "Seraceta-Duracol," black. Weft—360 (65) den. "Seracour-Duracol," black.

Top row (middle): A 16-shaft slub coating. Warp—2/36s 50% 4½ den. 6 ins. "Fibro-Duracol", slate and 50% 64s wool blend. Weft—as warp, and 3½s 45% 8 den. 4 ins. crimped "Fibro," 45% 64s wool, and 10% 300 den. "Ribbonfil" cut low.

Top row (right): Fancy twill blouse and dress fabric in light blue and white. Warp—150 (72) den. "Delustra." Weft—370 (78) den. dull "Seracour."

Centre row (left): A 2×2 twill sports shirting in light blue, white and grey. Warp—1/24s cotton (white and yarn dyed, drawn into pattern.) Weft—1/22s c.c. cotton spun 50% 1·5 den. 1 7/16 ins. "Fibro-Duracol" blend and 50% Peruvian cotton.

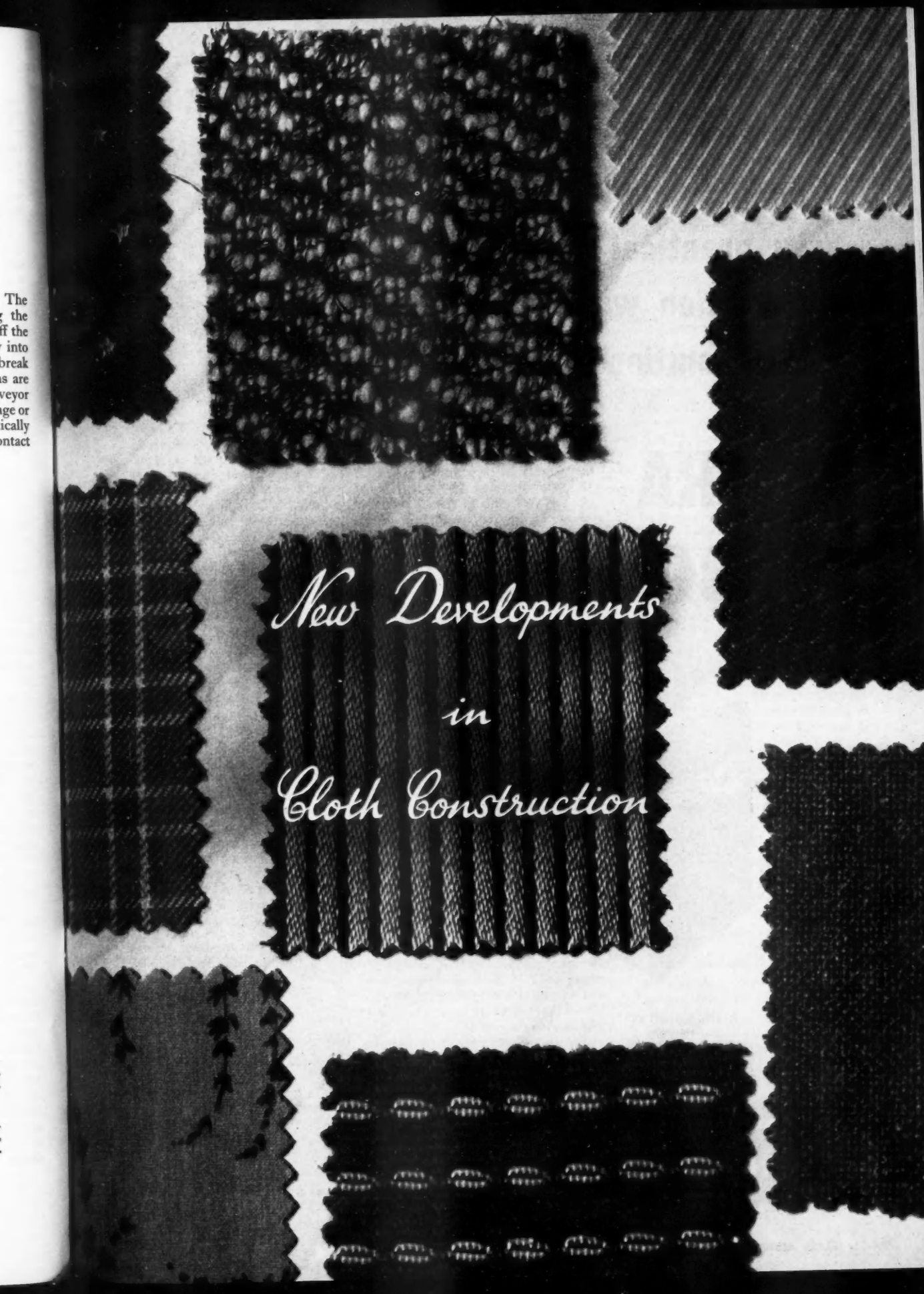
Centre row (middle): A plain weave, satin stripe, fabric for handbags and trimmings. Warp–140 (28) den. "Seraceta-Duracol," black (12 ends) and 400 den. ribbonstraw "Duracol" Atlantic (12 ends). Weft—1/32s c.c. cotton spun 1·5 den. 1 7/16 ins. "Fibro-Duracol," black.

Centre row (right): Dress cloth in green and brown. Warp—360 (65) den. "Seracour-Duracol" chocolate. Weft—360 (65) den. "Seracour-Duracol" viridian. Weave—12 end granite.

Bottom row (left): Washable printed blouse fabric, plain weave. Warp—50% China tussah silk and 50% 1·5 den. bright "Fibro" Greenfield top. Weft—as warp.

Bottom row (middle): Upholstery fabric, cord weave. Warp—10 thou. "Courlene-Duracol," emerald green and 10 thou. "Courlene-Duracol," garter blue. Weft—6/12s c.c. 3 den. 2 ins. "Fibro-Duracol, black and hunter green.

Bottom row (right): Dry cleanable suiting cloth, plain weave. Warp—2/20 sk. 50% 3 den. 2 ins. "Fibro-Duracol" blend and 50% 56s white wool (different blends of "Fibro" in simple yarns). Weft—as warp.


New Developments
in
Cloth Construction

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sliver to yarn spinning *really* *is* a practical proposition with the revolutionary *new*
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Quality Control in Spinning

Quality Measurement and Interpretation*

By A. CROSS†

QUALITY is that group of characteristics, excluding price, affecting the processing or disposal of the product, in this case yarn. To decide whether quality is necessary (merely desirable is not sufficient) one needs only to list those characteristics of importance to the spinner or the customer. This obviously depends upon the use to which the yarn will be put and, from a practical point of view, we have to ensure that quality is not too high as to be uneconomic, in addition to ensuring that it is not too low.

Each spinner has his own peculiar, perhaps unique, list of characteristics, and it is up to the spinner to decide on their respective levels. There is left, enumerating from an arbitrary zero—

(1) Measurement of quality.
(2) Improvement of quality (if necessary).
(3) Control of quality.

Pushing the process of summary dismissal to its acceptable limit, since the second of these deals with spinning technology, I propose to mention it only as it impinges upon measurement and control, and another equally good reason is that it is outside our terms of reference.

We are thus left with the measurement and control of quality. So far as we are concerned, measurement is either for the evaluation of quality as an end in itself, or alternatively, has as its object the control of quality. In the former the interval of time between measurement and subsequent action, is not a first order factor. In the latter, time is of the essence. It is appropriate here to mention a second classification. Whatever the purpose of the measure it may be done either quantitatively by instruments or qualitatively by the senses, and these two are not necessarily mutually exclusive.

One cannot say with absolute certainty what is the true result of a textile measurement, assuming that such a thing exists, and it is in attempting to deal with this sort of situation that statistical methods may be introduced. Since there is an impression that quality measurement and control is synonymous with statistics, perhaps it would help if the topic was put in its context. First, statistical methods may not be necessary, and are certainly not sufficient for efficient quality control. They have their good points —and their limitations.

In general, in making a measurement of the level of a characteristic, we are interested in comparing it with some standard or other. The standard may be laid down as a figure for example, count or strength, or it may be based upon general experience as with yarn appearance perhaps. Whatever methods of reaching a decision in this are used, and in whatever form the standard is expressed there are two alternative judgements. One states either, that a difference exists, or that it does not exist. But one runs the risk of making one of two possible errors. One may state that a difference exists, when none is present, or one may state that a difference does not exist when in fact the characteristic differs from standard.

These errors are shown diagramatically in Table 1.

Table 1

True situation	Decision Reached: Difference	Decision Reached: No difference
No difference	Error	Correct decision
Difference	Correct decision	Error

It is in this situation that the application of correct statistical techniques show the greatest benefit. In dealing with these techniques however, one should remember that the classical methods are based upon certain assumptions. Amongst other are these—

(1) That distributions conform to a standard type.
(2) That some of the parameters remain sensibly constant.
(3) That events occur at random.

If the statistical method to be applied is based upon such assumptions, and these do not tally with the situation, then we should not be surprised if things get out of hand. For example, suppose that ratch is present on a roving frame. Yarn spun from these rovings will not have a random distribution of weight per unit length, and a method of control based upon assumption of randomness is hardly likely to be a winner.

Let us move on to consider methods of measurement. Whatever characteristic is being measured, it is necessary to judge the method against a list of desirable features. Only in this way can one assess (*a*) whether the object of the measurement is being achieved, and (*b*) whether this is done efficiently.

For evaluation some of the features desirable will be—

(1) Speed and accuracy.
(2) Skill.
(3) Connection with the characteristic.

Additionally, for control, the scheme of measurement should indicate—

(1) Characteristics deviating from standard.
(2) The size and cause of the deviation.

Using the foregoing observations as a background let us consider.—

(1) Measurement and control of count.
(2) Measurement and control of strength.
(3) Measurement of yarn appearance.

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* *From a paper given at the recent one-day meeting organised by the Productivity Centre of the Cotton Board.*

† *Head of Testing, Charles Crabtree Ltd.*

Count Variation

In control of count we are primarily interested in control and reduction of variation. It is customary to split variation into three parts—short, medium and long term. Short term variation is the type judged by blackboards and will be discussed under yarn appearance.

A common method of measuring count variation of a medium term nature is by P.M.R. It enjoys the advantage of being easily obtained, but it suffers from two serious disadvantages. First, the variation estimated is generally that between leas of yarn, and clearly, the variation between leas has different degrees of importance depending upon the count of yarn spun, and its end use. Even more serious however, is that, if P.M.R. is considered too high, what can one do about it.

Since we are testing from different packages, we are sampling from both between and with package variance. Waves of appropriate lengths together with random variation from drawframes, slubbers and speed frames are all included in the within package variance. If the creel is mixed in relation to time, we include long term blow room variations in the between package variance. If the creel is mixed in relation to previous processes differences between average weights of these machines are included in the latter variance. The carrying out of the analysis and getting the figure clearly does not advance the cause.

A more practical approach is to decide the type of variation likely to cause trouble, and the main culprit is the drawframe. A routine test of sliver irregularity will provide far more valuable information than a P.M.R. figure, and the method of test should give within length variation and not between lengths.

For long term variation normally corrected by pinion changes, the ring frames as a control point have not found favour. This is due mainly to—

(1) Lack of sensitivity in the system due to time lag.
(2) Small and probably unrepresentative sample.

Yarn Strength

As a procedure for a direct quality control system, the measurement of yarn strength does not have much to recommend it. It is essentially a second line of defence. Other methods should record the causes of losses in strength, such as raw material control, adequate blending, and attention to machinery. Despite its unsuitability for control, the measurement of strength is necessary as there is no other way of obtaining directly the strength of the yarn than by measuring it in the yarn.

Having decided to measure strength, one may look at the purpose of the measurement in two ways. Either as a long term control and improvement indicator, or alternatively from the point of view of the subsequent performance of the yarn in processing or in the final product. In the former case, the measurement is designed to pinpoint differences, and highlight possible causes, and this is largely a question of appropriate sampling and organised material flow.

For the purpose of long term control of this nature, the normal lea strength is probably the best. The test is easily carried out, and is sufficiently sensitive to reveal differences of the type we have in mind. Unfortunately, the flow organisation, sampling and therefore the efficacy of the system are much impaired by frames spinning different counts, even from the same mixture.

From the point of view of subsequent performance, one requires some idea of average strength from the point of view of required cloth specifications. Again for this purpose, the lea strength by virtue of its productivity, is probably the best. For future processing, however, one is not interested in how strong the yarn is, but how weak it is. Attention should be directed towards the frequency of weak places.

The two characteristics discussed belong to that group whose levels are normally determined by instruments, and the results are usually expressed on a numerical scale using common units. In considering yarn appearance however, we are dealing with measurements made without the use of instruments, but with the aid of one or more of the five senses. Basically, the problems encountered are those of psychological measurement (applied to textiles), rather than textile measurement. The three main problems are:—

(1) To estimate the sensitivity of the test.
(2) To estimate the accuracy of the test.
(3) To express the results on a usable number scale.

The last problem has to be done first, since in order to tackle the first two, it is necessary to deal with numbers.

In order that a scale of values may be used for measurement, and the measurement averaged, compared, and treated with everyday numerical techniques two properties are required.

(1) A determinable zero (absolute or arbitrary).
(2) A progressive scale (arithmetic or geometric series).

Since the expression of results of sensory tests on a numerical basis has not been generally accomplished, the measurement of sensitivity and accuracy is not possible. To assume that it is not necessary, or to assume that the intrinsic accuracy of black card viewing is ample, is merely self deception. To avoid the difficulties associated with sensory tests, one may, possibly, test the characteristic quantitatively by shifting the test to some other point. For example, if we assume that the extraction of leaf, seed, etc., between card sliver and yarn is of second order magnitude, it is possible to analyse the sliver.

With neps, the problem of testing in the card web is not so easy. Neps may be made or removed during subsequent processing. The number of neps seen in yarn form depends upon the count. Short term irregularity can only be measured in yarn. A possibility is to use an irregularity tester but there is some doubt as to whether this is sufficiently sensitive to replace the conventional black card and whether, in fact, it is an appropriate substitute. Another method of measuring the characteristics directly is by the use of evaluation panels. It would appear, that, if such characteristics of yarns are of importance, a great deal of work has yet to be done in their measurement.

New Isolating Switch

The line of Type DOC.71 starters, introduced by British Thomson-Houston Co. Ltd. in 1953 and now well established for single- or three-phase motor starting up to 5 h.p., has been extended to include a range fitted with 3- or 5-pole isolating-switch units. Also available for fitting to the starter/isolating-switch assembly are an ammeter box and an HRC fuse box. The switch can be supplied as a 3-pole "on load" version rated at 30 amps. maximum (tested to break 100 amps. at 440 volts) or alternatively in 5-pole form with three main 30 amp. poles and two normally-open auxiliary poles for control circuits.

A small modification to the original design of starter case has been necessary in order to accommodate the new isolating switch. Consequently, it is not possible to fit the switch and the various attachments to existing starters of earlier pattern. The new line of starters, which comply in every respect with B.S. 587/1957 for "frequent-duty" starting (i.e. 40 starts per hour), has been designated Type DOC. 71-DT.

Cotton Board Conference

Raw Material Control*

By B. WHITEHEAD, B.SC.(TECH.)†

THE objects of raw material testing are (*a*) to select a material which, for the lowest cost, will produce a satisfactory yarn of consistent quality and desired characteristics and process sufficiently well to enable the machinery to be used to the fullest benefits and (*b*) to ensure bulk deliveries maintain the standard of the smaller quantity from which the selection was made.

Why Tests are Necessary

Fifty years ago the Lancashire textile industry was in its heyday, with a world-wide reputation for quality. Most of the machinery was non-automatic, and there was not the same emphasis on high productivity and labour utilization. What a contrast with today's conditions! Many new growths of cottons are available and economic factors discourage any long term buying. A great deal of blending with synthetic fibres is now undertaken, necessitating an intimate knowledge of fibre properties for its successful operation. Short processing, higher speeds, high drafts, emphasis on work study and labour utilization and use of automatic machinery all increase the emphasis on a strong level and consistent yarn, and reduce the "safety factor" or permitted variability to an alarming degree. New specialised finishes demand particular yarn and cloth characteristics which again are dependant ultimately on the use of the correct fibre.

A vertical organisation which has a knowledge of the end product for which a given material is going to be used has a great advantage over a typical horizontal spinning mill which must serve customers in a variety of trades, and, therefore, has to play safe. For instance, in our medium count mill we are spinning entirely for cloths which will be bleached, and are, therefore, able to buy a spotted cotton at a considerable discount, whereas in another mill part of whose production is sold to the trade we have to pay particular attention to colour.

Fibre requirements for a mill which is high drafting and short processing will be more critical than those for a conventional mill. Similarly a mill which is weaving its own yarn will benefit more from the production of an even yarn, and not only in the weaving department, but also in the preparatory processes. The types of cleaning machines in an opening line may also influence the types of waste which can be extracted from a material.

More cotton, particularly American, is tending to be bought on specification —not only length and grade which are automatically so, but Micronaire and Pressley readings also.

Properties Desirable in a Cotton and Tests

The factors which can influence these terms of reference for selecting a raw material are legion. Because fibre tests are performed on such a small sample of the total population it is essential that specimens are drawn from bales in the correct manner and from as large a number of bales as possible, where this is applicable. One of the first functions of a fibre testing department is to compile a library of cottons, listing various characteristics and suitability for end uses. These characteristics are:—

Length

(1) Effective length may be determined by a number of methods each of which gives a different answer.
- Baer Sorter—E.L. by distribution (numerical).
- Sueter Webb—E.L. by weight distribution.
- Fibrograph—U.H.M.
- Uster—E.L. and dispersion.
- P.E.S.—E.L. but no dispersion.

(2) *Distribution of Fibres*
Dispersion, co-efficient of variation uniformity ratio.

(3) *Percentage Short Fibre*
Important to waste, strength and yarn appearance.

Micronaire.—This has been the subject of controversy and misunderstanding mainly around the point that the Micronaire measures a combination of maturity and fibre fineness. The Americans only claim that the fineness of various cottons within the same botanical group, e.g. Upland can be compared, indeed the scale is graduated in these terms. The test has to be used with these facts in mind but, even under the conditions which are operative in Lancashire it can still be used to very great effect. Micronaire gives an indication of the following properties:—

(1) Fineness.
(2) Maturity.
(3) Dyeing affinity.
(4) Nepping potential.
(5) Waste potential.
(6) Ease of cleaning.

It can also be used to test efficiency of blending. Causticaire is also used and this gets over disadvantage of Micronaire not measuring maturity but is slower and more costly.

Fibre Strength — Pressley.—This plays an important part in yarn strength but is a relatively slow test (six tests for significant answers). The test now bears more relations to yarn strength since using $\frac{1}{8}$ in. gauge.

Grade and Waste.—For American cottons the grade should have a definite relationship to the amount of waste but for other growths a "Shirley" analyser test is essential. This will give the amount of waste which can be expected to be extracted and also the type of waste. This can be important in relation to the type of opening machinery as some machines will do a much more effective job than others with particular types of waste.

Dyeing Affinity.—This varies considerably between cottons and, whilst the Micronaire gives a good indication of this property, in the case of any doubt between two cottons an actual test may be of value. In one case we paid 1½d. more for a certain cotton but saved 2½d. on dyeing costs.

Spinnability.—Among factors which do affect this important aspect are:—
(1) Dispersion of length.
(2) Number of fibres in cross section of yarn.
(3) Nep and preparation of cotton—stringiness, etc.
(4) Doughnut fibres—rod-like fibres which have not collapsed. Rejected by u.v. light.
(5) Overginning. Ginners like to overheat cotton in gin to get better cleaning and higher output. The Americans may have the advantage

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* *From a paper given at the one-day meeting organised by the Productivity Centre of the Cotton Board.*

† *Head, Development and Quality Control, Smith and Nephew Textiles Ltd.*

here in that they can go to a particular ginnery and get their own cotton ginned as they wish. I believe work is going on to devise a test for this property based on the resiliance of a wad of fibres.

Most of these properties are normally included in the "character" of the cotton and personal judgment probably plays a larger part in the determination of this characteristic than any other.

Preparation of Sample and Testing of Yarn Properties

The Shirley miniature spinning plant represents an attempt to evaluate fibre properties by producing and testing a sample of yarn. My only reservations are the cost of the plant and also the fact that, due to the high drafts employed, the yarn properties are not necessarily reproduced, even comparatively, when spun on a production basis in the mill. The U.S. Department of Agriculture now do this as a routine test from a 6 lb. sample. The U.S. Department of Agriculture have also made an attempt to evaluate cottons by assigning relative percentage importance to the various properties measured in relation to an ideal fibre and so to arrive at an overall quality index for comparative purposes.

To summarise then, the following is a list of the more important tests which can be carried out on the raw material to assist in their selection and purchase.

Length.—Effective length, dispersion and per cent. short fibre.

Micronaire.—May have to be supplemented by fibre fineness tests if comparing different botanical growths.

"*Shirley*" *analyser.*—Amount and nature of trash.

Fibre strength.—To be used mainly, in my opinion, to eliminate very weak fibres rather than to compare marginal differences.

Visual examination.—To determine quality of preparation, colour, resilience.

U.V. light.—To eliminate samples exhibiting type of fluorescence which indicates uncollapsed fibres which give processing troubles.

Dyeing affinity.—Where applicable.

Preparing sample yarn.—To test if the various properties above react in the expected manner and also to provide standards against which to measure production runs.

Incoming Material

The following are the tests I would carry out:—

Length.—Test a sample from 5% of each incoming delivery for staple length and a 1% sample for dispersion and short fibre.

Micronaire.—Test one sample from each bale as it is unloaded and arrange the stock in Micronaire order. Feed to the opening machines in such a way that the average Micronaire reading is always being attained and check by Micronaire tests on laps and sliver. This ensures more level yarns, and breaks, neps, etc., also more even dyeing, drafting, waste extraction.

"*Shirley*" *analyser.*—Test one repsentative sample from each mix, and comparisons with the actual quantity and quality of waste being extracted by machinery.

Moisture content.—A moisture meter of the Shirley type which can be used quickly may be used to check the bales from the commercial angle to ensure that the bales only contain the allowable amount of moisture. Regularity of moisture within and between bales is also important for the consistent performance of scutchers and the elimination of count variation. Example of Winfeld Hansens.

Fibre Strength.—Test one sample from 5% of bales.

A quality control department should be judged not on the amount of paper it turns out, but on the amount of action taken on its findings. Tests should be simple, reproducible, quick, and the results readily understood. There is no replacement for good management ! No quality control department will replace the value of the manager and overlookers doing their own inspection and throwing out the bad bale or spotting a machine not functioning correctly. Because fibre tests are performed on such a small sample and the tests are subject to considerable operative and sampling errors they can only be taken as a guide. It is essential that a high degree of control be exercised throughout processing and the utmost attention paid to machinery maintenance.

Cotton Board Conference

Regularity and Machines in Opening, Carding, Combing and Spinning*

By W. NUTTER, B.SC.(TECH.)†

CONTROL of regularity in the blowroom has always been an extremely controversial point and it is known that moisture relations play an important part in the ultimate lap weight. The time taken for a piece of cotton to pass through a blowroom line of average length is approximately 20 mins., which means that the moisture content of the cotton is approximately in equilibrium with the atmosphere by the time it is rolled into a lap, but for a given relative humidity the moisture content depends upon whether it approaches equilibrium from the wet or dry condition.

If laps persistently run light or heavy, frequent changes must be made at subsequent machines, but the importance of short term regularity within laps can be over-emphasised. After two passages of drawing the sliver produced from a regular lap will be no better in long term variation than that from a lap showing ± 50% yard by yard irregularity. With existing spinning mill practice, within lap variation at the scutcher has no direct bearing on yarn regularity, but the scutcher is likely to remain a much abused quality control point for many years.

Flat Card

When the card is correctly set and in reasonable mechanical conditions it will not introduce irregularities into

* *From a paper given at the recent one-day meeting organised by the Productivity Centre of the Cotton Board.*

† *T.M.M. (Research) Ltd.*

the sliver. The most serious source of irregularity from this machine is the stripping cycle. Card sliver regularity is not usually subjected to a rigid control schedule; indeed with the most popular types of regularity testers it can be a most misleading procedure. It is often found that sliver taken from the top of a full can is more irregular than sliver taken from the bottom of an almost empty can.

The shape of a strand of fibre between the plates of a condensor will effect the capacitance, and sliver of the same mass will give different readings if their shapes vary. This is known as the "shape factor" and may lead to grave anomalies in the measurement of sliver regularity. Mechanical type testers are not influenced by this sliver shape.

Combed Slivers

Comber sliver regularity can be classified under three broad headings:

(1) Comber lap preparation.
(2) Comber sliver regularity.
(3) Post-comber drawing.

Control of regularity in the comber lap is usually restricted to occasional weight checks, and it is a difficult and tedious procedure with existing equipment to measure short term variation. The regularity of the sliver lap can be improved by using the Shirley formula; alternatively a modified draft distribution can be applied, inserting a tension draft not exceeding 1·08 in each zone. The settings can be fixed and the draft between the assisting rollers and lap drums should remain unchanged so that all lap weight changes are made at the ribbon.

Roller slip is a major contributor to irregularities in the ribbon lap and this may be minimised by applying a modified Shirley system. On the modified system, the back zone draft is not critical, provided it is within the range 1·35 to 2·0, and the neutral zone draft should be fixed at 1·03. Laboratory work on an improved ribbon lap system has shown that it is possible to produce up to 40 dwts. laps of excellent regularity, suitable for combing on modern high production machines. With the newer types of lap preparation involving drawframes followed by a lap former, the question of lap irregularity does not arise.

Comber Sliver Regularity

From this point onwards, the regularity of the strands of fibre peculiar to cotton spinning may be governed by certain statistical rules.

It has been shown that the best fibre arrangement which can be expected is one of complete random order of fibre ends and the irregularity of such a strand can be expressed by:—

$$V_R^1 = \frac{100^2}{N} + \frac{Vm^2}{N}$$

where V_R = C. of V. of wt./unit length of strand.
N = Average number of fibres in cross-section.
V_m = C. of V of fibre wt./unit length.

The figure given by this expression is termed "random variation." V_m is small and the expression is sometimes conveniently abbreviated to:—

$$VR = \frac{100}{\sqrt{N}}$$

The extent that random variation is present in strands depends upon the number of fibres in that strand and with existing processing techniques it can be quite high in a medium count combed yarn. In the sliver, however, random variation is small and this indicates that there is still considerable room for improvement in sliver regularity.

	Fibre No.	V_R	V. Actual
Comber sliver 16 hk.	24,000	·65	5·0
2nd passage drawframe 16 hk.	24,000	·65	2·0
Intermediate roving 1·3 hk.	3,000	1·8	4·0
Yarn 30s counts	130	8·8	10·0

Practical Results

Because the condition of the slivers entering this drafting system has a marked effect on the regularity of the drawbox sliver, some explanation must be given of the factors influencing the head sliver regularity.

Lap Regularity—is not very important.

The Piecing—at the comber head is of vital importance.

The Comber Table—will cause sliver stretch if a poor piecing is made at the head.

Thus, the slivers entering the comber drawbox all contain periodic irregularities of the same wavelength and each sliver is composed of tufts joined together by an overlaid piecing. The piecing waves in the individual slivers are brought into phase as they pass through the drawbox and the sliver emerges containing a large amplitude variation called the "drawbox wave." The wavelength of this variation bears a direct relationship between the piecing wave and the drawbox draft and the amplitude varies according to the quality of the piecing obtained.

Post Comber Drawing

The drawbox waves tend to move into phase at the first passage of post comber drawing, so that a further periodic variation in sliver thickness is created and this phenomenon may persist up to the second or even the third passage of drawing, with progressively increasing wave length and decreasing amplitude. Where quality is not very important one passage of post comber drawing may be used, but only in exceptional circumstances does the regularity approach that obtained by two passages. It is important to produce regular comber sliver and eight ends should be creeled to the drawframe.

Carded Sliver Regularity

The lack of orientation in card slivers increases inter-fibre cohesion and there is a tendency for roller slip to occur, particularly at the first passage of drawing. A drafting wave is also introduced due to the movement of uncontrolled fibres and this wave is amplified by the presence of nep and impurities, which interfere with fibre movement.

The card sliver itself always shows extremely good short term variation. At the first passage of drawing the regularity deteriorates because of the drafting wave and a further deterioration takes place at the second passage. It is not until the third passage of drawing is reached that minimum sliver irregularity is achieved with carded cottons. In order to produce regular slivers from carded qualities, the following conditions must be established:—

(1) A wide safety margin against roller slip.
(2) A progressive improvement in sliver regularity.

Safety Margin Against Roller Slip

Roller slip occurs when the grip exercised by a pair of rollers is not equal to the force necessary to draft the slivers. Drafting force depends on:—

(1) The draft in that zone.
(2) Sliver bulk and fibre orientation.
(3) Roller settings.

A top roller may slip backwards or forwards, but it is the former which is most likely to occur in an intermittant form on the 2nd line of a 4-line graduated draft system, causing a large amplitude irregularity in the sliver with a wavelength of approximately 9 ins. This is overcome in the Shirley system by re-distribution of draft and by introducing a double nip point at the 2nd and 3rd lines of rollers. It has been found that if the 2nd line of

rollers is removed from a 4-line system and the distribution of drafts arranged to grossly unbalance the forces between the two zones, intermittant slip can be avoided completely. The simplest way to avoid roller slip at the 1st passage of drawing, therefore, is to use a 3-line system with a break draft of 1·25 to 1·4.

Careful examination of a regularity trace taken from first passage drawing sliver should reveal a periodic irregularity which is due to irregular drafting of the entangled fibres in the card sliver. When these slivers are creeled to a drawframe the irregularities tend to move into phase in much the same way as the piecings in the comber head sliver, but the effect is much less marked. This phasing tendency can be suppressed by using a single zone drafting system at the second passage of drawing and again at the third passage, and under these conditions a gradual improvement in regularity takes place from first to third passage.

The four speakers are (l. to r.) Mr. J. Howarth (Fothergill and Harvey Ltd.), Mr. W. Nutter (T.M.M. Research Ltd.), Mr. A. Cross (Charles Crabtree Ltd.), and Mr. B. Whitehead (Smith and Nephew Ltd.)

Speedframes

The drafting system at the speedframe must influence roving regularity. It has been our experience that aprons are not an effective method of controlling large bulks of fibre and it is recommended that slivers entering an apron zone should be finer than 40 grains/yd. For drafts up to 10 a standard 3-line or some form of single zone roller arrangement are the most satisfactory for medium and long staples. For higher drafts 4-line 2-zone drafting will meet all requirements.

One aspect of roving regularity has been the subject of investigation and involves two popular methods of producing a roving by two passages of speedframe.

(1) High draft intermediate can creel —3-line rover.
(2) Slubber—High draft rover. Bobbin creel.

The following results are typical and the irregularity of the slubber—H.D.R. combination is characterised by a periodic variation with a wavelength of approximately 5 ins.:—

	Test 1	Test 2
H.D.I.—Rover ..	7·6%	8·9%
Slubber—H.D.R. ..	8·7%	11·7%

Draft Distribution: Speed Frame/Ringframe

Providing a suitable high draft system can be developed for the ringframe and the creeling problem overcome, the speedframe becomes obsolete. It is important to know the optimum distribution of draft between high draft speedframes and ringframes and experiments have been made to examine this. Single roving spinning was employed to simplify the test.

$1\frac{1}{3\frac{1}{8}}$ ins. combed Egyptian
0·16 hank sliver to 72's.
Total draft: 450.
Draft varied from 10 to 45 in each machine.

$1\frac{1}{1\frac{1}{8}}$ ins. carded American
0·14 hank sliver to 28's.
Total draft: 200.
Draft varied from 6 to 33·3 in each machine.

It is only at the extremes where there is a serious drop in yarn quality and the distribution of draft between speedframe and ringframe cannot be considered critical. It is significant, however, that equal distribution gives the best result for each cotton quality.

Roving Stretch

The most serious irregularities are likely to be introduced into the roving after it has left the front roller of the drafting system. These may be due to:—

(1) Roving stretch during the bobbin build.
(2) Roving stretch on the initial layers.
(3) Between row variation.

Ratching has always been a common fault on speedframes and is due to incorrect winding tension. The effect of incorrect tension is amplified by:—

(1) Unequal distribution of twist from bobbin surface to front roller nip.
(2) Inadequate support of the roving.

The Shirley bored-out flyer and Dobson and Barlow's insert were the first attempts to achieve uniform twist distribution. By dissipating the winding tension close to the bobbin surface, no tension exists in the unsupported length of roving and tension adjustment is much less critical. The 2-hole flyer is an example of tension dissipation, but high tension winding can be achieved in a number of ways, each of which are equally successful. The simplest method is to increase the number of roving wraps round the presser.

Cone Drum Profile

It is possible to get a coarsening in hank during bobbin build if the winding tension of the first layer is too high, but this can be adjusted by gears or by strap fork position. The outstanding factors outside our control are (*a*) variation in bare bobbin diameter and (*b*) starting a doff in the middle of the lift, and to accommodate them, the initial winding tension is nearly always high.

Between row variation is a subject which is still being investigated. The front row bobbin tends to be softer, slightly finer and longer due to roving stretch in the long unsupported region between flyer top and front roller nip. Two methods of approach have been tried in the laboratory:—

(1) Different flyer top design on each row to give more effective twist in the front row.
(2) Extended flyer tops on back row so that roving meets the hole at the same angle.

Ringframes

Long term variation should not be introduced by the ringframe, assuming roller grip is adequate and no slippage occurs. Short term irregularity at the ringframe is purely a question of drafting and its associate problems of fibre control and mechanical imperfections. The most popular cause of short term periodic irregularity in yarns is front roller eccentricity, but generally the effect is due to multiple causes associated with the drafting mechanism. This type of irregularity which is certainly one of the most serious can be determined by taper blackboards or by frequency analysis.

Importance of Regularity and Fibre Arrangement

Regularity is the cornerstone of quality control in a spinning mill and the focal point is the finisher head of drawing. Fibre arrangements in carded slivers can influence yarn quality to a marked degree and can have more effect than regularity with very short processing. Experiments carried out with pre-ringframe drafts varying from 0 to 1,080 showed that the effect of reversals becomes unimportant with conventional card-room practice when the draft in the roving exceeds 180 and that when card sliver is creeled direct to the ringframe a difference of 50% in yarn strength can be attributed to the direction of fibre presentation to the drafting system. The importance of fibre parallelisation and fibre arrangement is even more important if slivers are creeled direct to a very high draft system at the ringframe. It has been found that the number of machines between the card and the ringframe should be an odd number unless an artificial reversal can be introduced.

Looking back to the modern short processing mill, control of regularity is no easy problem and may not be very rewarding on certain machines.

Scutcher laps—Abused and relatively unimportant except to prevent a drift to heavy or light laps.
Card sliver—Unnecessary, except for occasional hank checks to confirm Scutcher lap weight.
Comber laps—Sliver lap should be a fixed draft machine. Ribbon lap should be checked occasionally.
Comber sliver—Regularity not important unless extremely bad.
Finisher drawframe—Very important and must be strictly controlled for hank and regularity.
Speedframe—Very important for hank and regularity from full to empty bobbin.
Ringframe—Too late.

Cotton Board Conference

Problems in the Introduction of Quality Control*

By J. HAWORTH, B.SC.(TECH.)†

THE task of the line organisation in a spinning mill is to produce the required amount of yarn of the right quality at the right time and at the lowest possible cost. From this it is clear that if quality control is to be of benefit to the organisation its emphasis must be on preventing faulty material being produced before the product becomes defective. The benefits gained thereby are a reduction in waste and an increase in both quality and quantity.

Control techniques have to be flexible and designed to suit the varying conditions in individual mills, but I must stress that the objective is to produce a yarn with the required average quality characteristics and the minimum variation in these quality characteristics. These objectives are the same for all mills. Broadly speaking control of quality at all stages of production is a four step operation, consisting of:—

(1) The setting of realistic standards.
(2) Measuring of conformance to standards.
(3) Initiating corrective action.
(4) Planning improvements.

As the key factors in quality at all stages are raw material, machinery, labour and management, it is a mistake to neglect any of these in the application of quality control and I will show how these key factors all play their part in the scheme.

Control in the Blowing Room

Blending.—The ideal system is one where a precise blend, uniform in weight, density, volume and fineness, is fed every hour of the day. In my opening remarks I stressed that the operation of quality control must be applied to raw material, machinery, labour and management. There is no control chart technique which can ensure or check that the blend is uniformly fed. It is the task of mill management to train the operatives and keep a check that the cotton is being fed correctly and that there is no overfeeding of soft waste as this will cause both excessive variation and rejected laps.

Lap Production.—The starting point of yarn count control is in the blowing room and the maintenance of scutcher control depends upon producing and passing forward to the cardroom, laps that are sufficiently uniform in weight per unit length and in total weight. If laps are fed regularly to the cardroom as they are produced consecutive laps within say four hours' production will progress through the cardroom together. The variation in total weight and in weight per unit length of these laps will be represented in the same finisher sliver at the drawframe. Carding and doubling at the drawframe will tend to iron out the variation in lap weight per unit length, but will have no effect upon the overall lap weight, i.e. if the average lap weight is heavy the finished sliver at the drawframe will also be heavy.

It is this factor of maintaining a constant average lap weight, especially between days production which has to be kept under control. It is essential therefore that all factors which can give incorrect results be removed. These are so obvious that they are worth mentioning.

(1) Firstly, the tare allowance on the scale for the lap rod should be the average lap rod weight. Lap rods should all be checked and rejected if not within ± ½ oz. of the average weight (this weight of course,

* *From a paper given at the recent one-day meeting organised by the Productivity Centre of the Cotton Board.*

† *Research Technologist, Fothergill and Harvey (R. and D.) Ltd.*

depends on what accuracy is required).

(2) Secondly, the accuracy of the lap weighing machine should be checked at regular intervals.

(3) The third factor influencing weight is moisture, and in my opinion this is the most controversial subject, not only in Blow room control but at all stages in processing. As the moisture regain varies with the relative humidity of the atmosphere, unless this is strictly controlled at all stages of production, the weights per unit length which are recorded for the purpose of count control, will be weights of material containing varying amounts of water, depending on room conditions.

Where room conditions vary appreciably an attempt to keep the weight of the product constant by, e.g. changing machine settings, could result in the final product being more variable in dry weight than if no attempt at control had been made. To attain a consistent dry weight, the target weight for the product must first be adjusted according to the moisture regain of the material being processed and only after weights have been so adjusted should machine settings be altered.

I feel that if a mill decides it is essential to make allowance for moisture, the moisture regain of the cotton in the lap should be used as a basis for tare correction. Over a period of one year, daily checks on the moisture regain of cotton taken from laps immediately after weighing showed that the overall variation in regain did not justify the expense of routine testing on this variable. Long term variations in moisture are important but it is simpler and safer to make allowance for moisture regain on drawframe wrappings.

Setting Limits and Rules for Making Adjustments.—It is conventional for the effect of variation in lap weights to be mitigated by sending back for reprocessing, laps that are off-weight by more than a certain amount. In most cases the limits set are nominal and unrealistic and if applied would result in a considerable amount of reprocessing. A rule for making adjustments must strike a balance between making them too seldom and too late on the one hand, and too frequently on the other.

In practice, the information on which the scutcher is adjusted is received after the lap that is weighed has been processed and the adjustment affects the next lap. If an adjustment has been made in an attempt to correct for a deviation lying within the normal machine variation and which therefore would have disappeared or changed in the next lap, the adjustment will have been wrongly made. Adjustments should correct for persistently long term trends, and be delayed until it is clear that the departure from the nominal weight is persistant. To do this, realistic "*action*" limits have to be set calculated from observations of lap weights made over a period of time. A rule can then be made as follows:—

Lap weights lying within $\pm x$ ozs. (normal chance variation) from the nominal need no adjustment. Adjustments have to be made to the scutcher after every lap which is off-weight by more than x ozs. by an amount which will correct for half the weight off-set. In addition to this, any lap which deviates by more than an amount $\pm y$ ozs. should be rejected and sent back for re-processing. This figure, y ozs. is determined again by the variation and should be set to give not more than 2 - 3% rejects if the blowing room is to function efficiently.

Blow Room Control.—The carder has a difficult task in the blowing room as more often than not, the labour is not quality conscious, and it is helpful to him to have a daily check showing whether the average lap weight has changed appreciably.

The procedure to do this is to classify each lap after weighing as being heavy or light, no matter by how little. A blackboard can be used to record the results divided up as shown in Fig. 1.

If the controls have been properly operated, the number of heavy and light laps should be nearly equal. Chance alone will cause some deviation from this ratio and limits can be set accordingly, using the formula:—

$$0{\cdot}5 - \sqrt{\frac{1{\cdot}5}{n}} \text{ and } 0{\cdot}5 + \sqrt{\frac{1{\cdot}5}{n}}$$

where n is the number of laps per day.

Then, only if the actual deviation exceeds these limits, will there be evidence that the control is not being properly maintained.

Checks on Condition of the Scutcher.—A sensible procedure is for a lap from each scutcher to be tested along its length for yard/yard weight variation once per week, the variation being expressed as C of V%. An analysis of the results obtained over a period of time will indicate what the normal variation is and a limit can be calculated. If the lap has a variation higher than this limit the scutcher involved is checked and when the fault has been corrected, another lap from the offending scutcher is re-checked. I have found that this test is invaluable and has resulted in improvements not only in yard/yard variations but also in total lap weight variations.

Control on Cards

The problem with cards is totally different as we are dealing with a large number of machines which vary enormously in characteristics. Cards giving high nep counts are invariably found to have some easily corrected defect, such as poor settings, or blunt or smooth wire and when these are corrected the nep counts are reduced. It is the aim of control at the cards to pinpoint the very bad cards so that corrective action can be made. The two methods of test are available:—

(1) The first is to count the actual number of neps in a given area of web. This method of counting is satisfactory, provided that the operator carrying out the test does

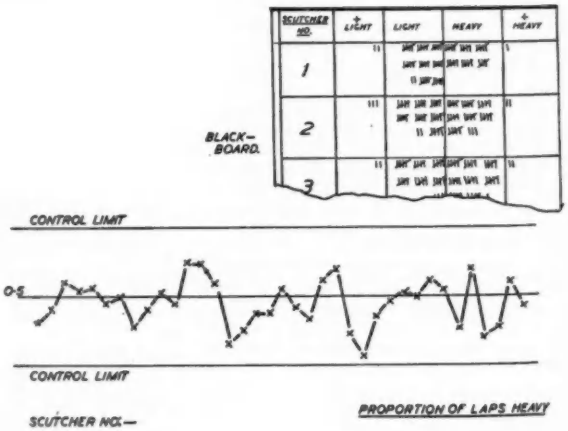


Fig. 1. Results of blowroom control

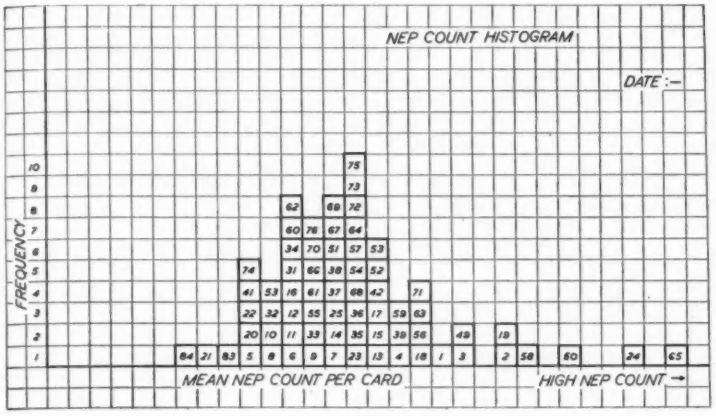


Fig. 2. Histogram of nep count at the card

not change her idea as to what constitutes a nep.

(2) The second method is the "Shirley Method" which makes use of the Poissonian distribution. Instead of attempting to count the number of neps in an area of web, the number of cells in the template containing nep are counted, and this number can be expressed as a nep count by use of a conversion table.

The formula used in calculating the conversion table is as follows:—

$$M = \frac{\log A - \log (A - X)}{\log e}$$

where A = the number of cells 1 sq. in. in area
X = the number of cells containing nep
M = the number of neps per sq. in.
log e = log 2·72 = 0·434

With the use of the Shirley method the number of occasions when a doubtful nep has to be classified is much reduced, since such classification has to be made only for those cells containing a single doubtful nep in isolation.

A test procedure found to work in practice is as follows: all cards are tested within a four-weekly cycle, each card being counted at three separate times to give a mean value. Five samples are taken at each count and the counting is done by one operative at the card. The results, in histogram form, appear in Fig. 2.

The card number is given and by this method the carder is in a position to concentrate his maintenance on the cards giving the highest values. The following monthly tests will show whether an improvement has been effected to these cards. When sufficient data is available control limits can be calculated and added to the histogram.

Drawframes

The key point of controlling hank and regularity in a spinning mill is at the drawframe, and the method of hank control which yields the most information is the control chart system. Were consecutive wrappings to be taken on the production from a drawframe, a variation in hank readings would be evident. It will be realised that not all this variation is due to chance. Much can be attributed to a change in machine setting or to variation in the material being fed, or to changing humidity conditions, etc. This type of variation is due to assignable causes.

The control chart is a means whereby it is possible to distinguish between chance and assignable variation. By the use of simple statistical techniques, it is possible to set the limits of the chart to allow for all chance variation, such that when the weight of a selected length of sliver falls outside these limits, a one-tooth change wheel difference will bring the sliver weight back into control. It is essential to nullify the effect of moisture fluctuations by actual measurements of the regain on an accurate moisture meter at the time of testing. There is no rigid rule with regard to the frequency and density of sampling. I have found it convenient to test all drawframes twice a day taking deliveries 1 and 3 in the morning and deliveries 2 and 4 in the afternoon. The resulting control chart takes the form shown in Fig. 3. Advantages of this technique are:—

(1) The carder has a current record of the conditioned weight of sliver he is processing. He is relieved of the task of judging the prevailing weather conditions to decide whether heavy wrappings are due to excess moisture or to a change in the weight of cotton.

(2) The chart clearly shows the change wheel on each frame. When a weight of sliver exceeds the limit a change is made and this is noted on the chart. The subsequent wrapping will show that the change has corrected the deviation from nominal.

(3) Control charts indicate trends and if the trend is persistent action can be taken before the weight actually exceeds the limit.

(4) Percentage deviation figures from nominal serve as an excellent medium for the expression of the wrappings on the chart as they can be more readily appreciated than gram weights. This is particularly so if more than one hank of sliver is being processed.

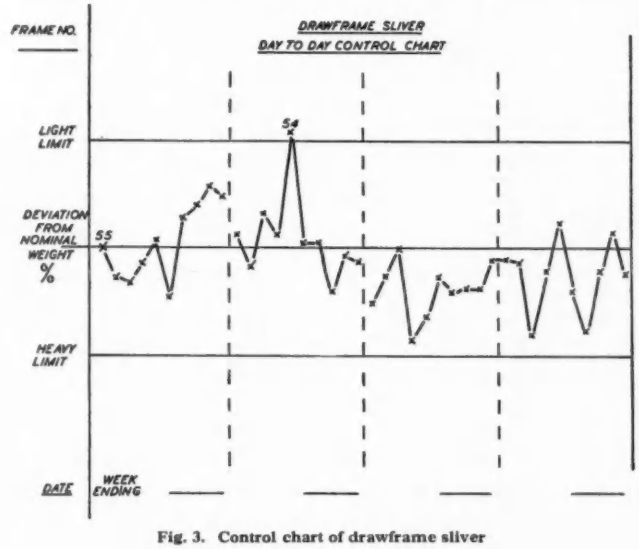


Fig. 3. Control chart of drawframe sliver

Difficulties do arise in the introduction of control charts. The responsibility of count control shifts from the carder to the quality control department and a carder is loth for this to happen unless he has confidence in the scheme. It is essential therefore that this confidence be gained. I recommend that once agreement has been reached the change-over from the old to the new system should be spread over a period of from 4 - 6 weeks. In this time action is taken on the old system whilst control-chart wrappings are plotted to show the effectiveness of this system. During this interim period, occasions will arise when a change made under the old system was unjustified and also changes will not have been effected when they were warranted. This testing period serves also to check that the calculated control chart limits are, in fact, correct.

As yard/yard lap weight variations indicate the mechanical condition of the scutchers so is it also necessary to have some such measure of the condition of the drawframe. Short term sliver variations at the drawframe give rise to warp streakiness and weft bars in fabric. It is advisable to test the variation from all drawframe deliveries on a regular basis. The rule here should be that all deliveries giving a C of V% value above a certain limit should be checked immediately.

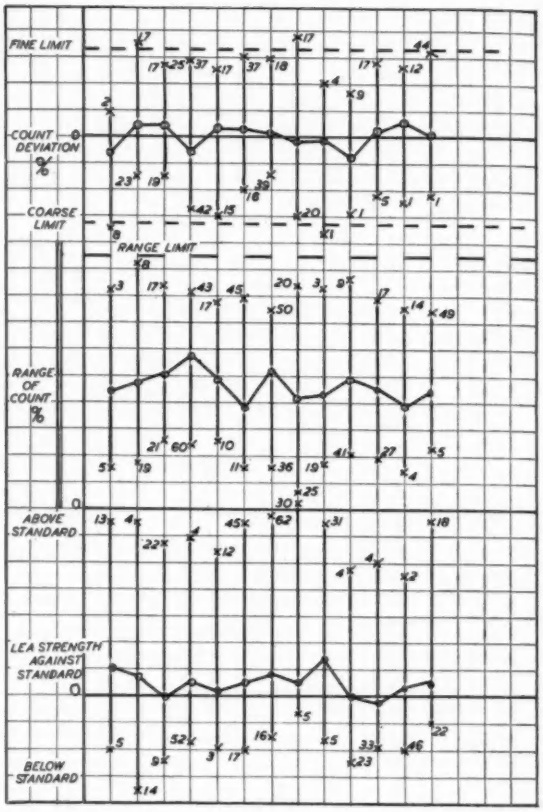


Fig. 4. A considerable amount of valuable information can be quickly obtained from group control charts

Yarn Control

Process Control.—It is too late to control count at the spinning stage. The objections to doing this are as follows:—

(1) **It uses the production of incorrect material as the means of controlling that process.**
(2) **The proportion of material which can be tested is very small. The bobbin to bobbin count variation on a spinning frame is of such an order that the control limits with this limited sampling are too wide to be effective.**
(3) **The time taken from receipt of test material to the moment of action is too great.**

This being the case, process control as such in the spinning room can be limited to spot checks when a change in count is made on a frame to ensure that the correct change has been made.

Check on Quality Characteristics.—Routine testing of yarn count, yarn strength and count range within a frame is carried out in most mills and these tests are essential as a check on the final product which one manufactures. Much useful information can be obtained from these results in determining trends and spotting within and between machine variations by using group control charts (Fig. 4). The main counts which are in process are chosen as being representative of present production. It is convenient for mills spinning a large variety of counts to select a coarse, medium and fine yarn for the charts.

Frame numbers for the extreme values of mean count range within a frame and yarn strength are noted on the graph for each basic count. It is surprising how effective this sytem can be. Taking mean count as an example, it may be noted that over a period, a certain frame is consistently spinning finer (or coarser) than other frames spinning the same count, and investigations as to the cause can be instigated. The same applies for frames consistently giving lowest strength values or high count range figures. These facts do go unnoticed when results are merely listed in weekly test report.

Conclusion

Many factors influence quality, and quality control is only one of them. The mere introduction of a quality control scheme is not sufficient to achieve and maintain good quality in itself. It is only effective if it is integrated with all other relevant factors and this will be so if there is confidence in the scheme and if management is taking action on the basis of its findings. Further, I would suggest that control of quality can best be served by a much closer integration and supervision of the tasks at present carried out, independently in most mills, by mechanic, overlooker and laboratory superior.

New Insulator for Pipes

A new and easily applied covering made of flexible foamed plastic suitable for insulating hot or cold pipes has been developed by Armstrong Cork Co. Ltd., Bush House, Aldwych, London, W.C.2. Made in sizes to fit any type of pipe from $\frac{3}{8}$ to $3\frac{1}{2}$ ins. outside diameter, it can be either "sleeved on" or alternatively slit lengthwise for installations already erected, in which case the cut seam is sealed with an adhesive which provides a moisture-proof joint.

Known as "Armaflex," the material is suitable for use on copper tubing as well as iron pipes, and is stated to have a thermal conductivity of 0·28 B.Th.U's at 75°F. A $\frac{1}{2}$ in. wall thickness of "Armaflex" is said to prevent condensation under normal conditions on indoor lines operating at temperatures as low as 32°F., while under less severe conditions a $\frac{3}{8}$ in. wall thickness will prevent condensation on pipes of up to $2\frac{3}{8}$ ins. outside diameter.

New Electromagnetic Warp Winder

With warps in cuttled form—properly prepared and processed—winding speeds of 150 to 350 yds./min. are obtained, depending on the counts and strength of the yarn

THE Model "N" electromagnetic warp winder recently introduced by Thomas Holt Ltd., Rochdale and Darwen, is said to improve the quality of the wind, whilst considerably increasing the speed and size of package produced.

Package Dia. (ins.)	Package Length (ins.)	Wt. of Yarn (lbs.)
4¼	10⅛	1⅛
4½	12	2
4¼	13⅜	2½

The Model "N" enables continuous control over yarn tension and speed to be maintained, thus almost eliminating breakages and allowing packages of high or low even density to be wound. With warps in cuttled form, properly prepared and processed, speeds of winding of 150 to 350 yds./min. are obtained, depending on the counts and strength of yarn.

The advantages of the Model "N" are seen when compared with the present friction-driven spindle machine in which the spindles are upright and placed in the form of a sloping bank, the slope going away from the operative to a spindle position up and back from the front roller. This construction is quite suitable for packages up to ½ lb.

This form of spindle disposition, however, is impossible for the size of package produced by the Model "N." The spindle of the 378 machine is driven by a band which, in turn, is driven by a tin roller. The drive to the yarn is transmitted through a friction clutch, the pressure on which varies as the weight of the package. For the size of a package catered for by the 378 spindle machine, this condition is not objectionable but, as shown in Fig. 1, difficulties arise when making a much heavier package. Figs. 2 and 3 demonstrate the impossibility of placing the spindles of the Model "N" relatively similar to the 378 machine.

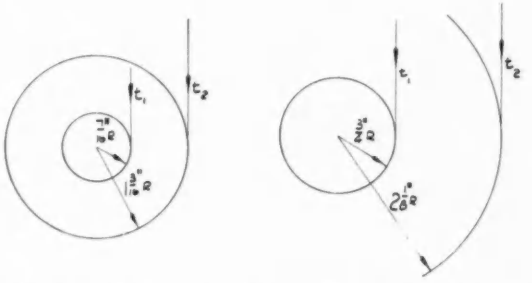


Fig. 1 (left): 378 S.P. (right) Model W

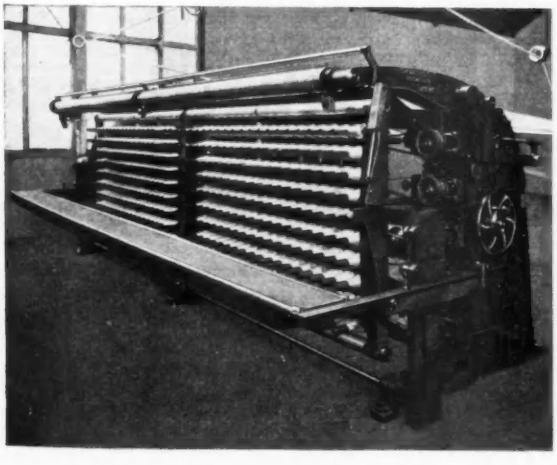
Operation of Model "N"

The tension stand A around which the cuttled warp is wound is shown in Fig. 4, and the tension in the warp is produced by the yarn pull from the spindles resisted by the brake and tension indicator B. This brake is in the form of a spring-adjusted strap so that all variable conditions which affect the co-efficient of friction of the brake material can be neglected. The tension in the warp is clearly indicated and can be regulated as desired. The yarn pull is produced by a flat belt E which derives its drive from a variable speed coupling. F is the magnetic coupling that drives the spindle, which has a new arrangement of doffing cup to facilitate removal of the doffing coils.

To maintain constant yarn speed, the speed of the spindle must vary in inverse proportion to its winding diameter, therefore, depending upon the number of coils and ratio of the chase, the package has to be accelerated and retarded to conform to constant yarn velocity conditions. Similarly, to maintain constant tension in each individual thread, the driving torque in the spindle has to be increased as the yarn winds on the pirn if we consider the coils to be winding from the small to the larger diameter, and reduced when the coils reverse. The magnetic coupling in each spindle fully covers these conditions, in so much as the torque transmitted by the coupling is proportionate to the slip or the difference in revolutions between the spindle and belt pulley.

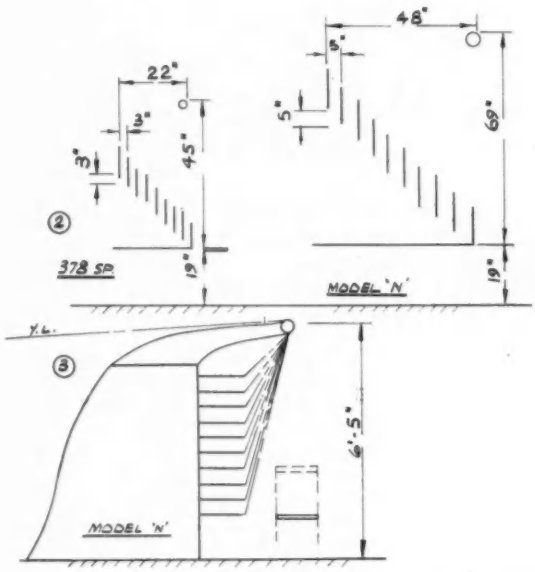
This is probably the most important feature of the machine in that a continuous and automatic control of tension has been achieved by the introduction of the electro-magnetic spindle. The yarn take up by this spindle is completely self-adjusting and as a result tension variations from the pre-selected and adjustable mean value are remarkably small (a figure of no more than 1% has been suggested). Further the new machine is claimed to give a marked improvement in yarn quality with fewer end breakages, also offering much higher production rates than previous machines of this type. In addition, varying the initial slip ratio, enables any desired speed and tension within the range of the equipment to be obtained, as shown by the following example.

If it is desired to wind at a speed of 250 yds./min. with a yarn tension of 4 ozs., the torque required would be $4 \times \frac{1\frac{1}{2}}{2} =$ 3 oz. ins., where the empty diameter is 1½ ins., and the speed of the bobbin would be 2,000 r.p.m. When the yarn is winding on the full diameter (e.g. 4½ ins.), the



Model "N" electromagnetic warp winder

Electro-magnetic spindle



Figs. 2 (above) and 3 (below) demonstrate the impossibility of placing the spindles of the Model "N" relatively similar to the 378 machine

torque required to keep constant tension is

$$4 \text{ ozs.} \times \frac{4\frac{1}{2}}{2} = 9 \text{ oz. ins.}$$ At $4\frac{1}{2}$ ins. dia. the spindle speed for a winding speed of 250 yds./min. is 636 r.p.m.

The yarn tension is maintained constant by the tension stand, hence any change in torque requirements must be reflected as a change in yarn speed. But the yarn speed changes are accurately controlled by a tachogenerator control which alters the driven spindle speed thus maintaining slip speed and hence torque and winding speed to the required amount. It is by these means that the yarn velocity and tension are maintained constant for all practical purposes. As the package builds up from its empty weight of $\frac{1}{4}$ lb. to full weight of 3 lbs., the mass of the parts to be controlled is increasing. This is taken care of by the control to the driven side of the magnetic coupling which increases the speed and the amount of slip to compensate for the increase in weight.

In addition to this automatic control of the tension, speed, and compensation for increasing weight, there is an overall speed change from zero to maximum under control of the operator. The speed control bar runs the full length of the machine and stays in any set position. At the stop position the motor is still running and a small adjustable amount of tension on the yarn prevents thread entanglements and enables the operator to take up slack yarn on tying a knot. Further rotation of the bar gradually increases the torque and hence the winding commences as slowly as desired, the position of the bar controlling the winding speed. The full turn position of the bar is the top speed of the machine. The yarn speed is automatically held at all control bar positions and there is a direct reading yarn speed indicator in view of the operative. The operator stands upon an adjustable platform so that in the top position she has full view of the yarn coming to the top roller, whilst the platform is foot controlled for lowering purposes, to facilitate access to the lower spindles.

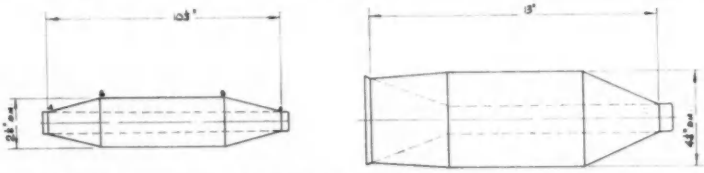
The copy carrying the yarn guiding means to the bobbin, is in the form of a series of horizontal rods mounted in a suitable framework. It is driven from the large diameter yarn guide roller over which the yarn passes from the warp tension stand before proceeding to the individual spindles. This means that the ratio of yarn traverse to take-up of yarn is always constant, as it is directly related to the actual speed of the yarn itself. Change gears can be provided to vary the wind ratio if desired. All revolving parts are mounted on ball or needle roller bearings. The main features of the machine may be summarised as follows:—

Automatic Tension Control: The electro-magnetic spindle characteristics provide automatic tension control irrespective of the radius at which the yarn is wound, or size of package. Further, total tension in the warp is pre-determined at the warp tension stand, and once set cannot be exceeded.

Automatic Speed Control: The yarn speed is infinitely variable from stop to full running speed by a control bar accessible over the full length of the machine. The operative can run the machine at any speed at any time during the building of a package, with this one control. The winding speed is continuously indicated to the operative.

Automatic Package Size Control: The diameter and shape of the package are set by a form bar and this diameter and shape will be maintained irrespective of changes in yarn counts, tension, speed, or any other factor.

Automatic Yarn Take-up: With the speed control bar in the stop position,



(left) Friction driven package (·5 lbs.). (right) Model "W" bobbin package (2·5 lbs.)

tension is maintained on the threads at any pre-determined amount. This tension can be of any required value between nothing and the full winding tension as set at the warp tension stand. Any slack yarn caused by tying in broken ends is immediately wound on the bobbin, thus maintaining correct yarn line and tension.

Automatic Tension Stand: A new design of warp tensioning system allows tensioning of the warp by a single handwheel adjustment; tension on the warp is continuously indicated to the operative.

Doffing Cups: Extra large size doffing cups are provided with a consequent gain in production, reduction in lost time and reduction in labour requirements. The yarn can be mechanically removed from the doffing cups by a special design tool without having to cut the yarn off.

Electro Magnetic Spindle: The exclusive feature of the patented spindle drive coupling is that by varying the driver pulley speed, the torque, and hence the yarn tension, of the spindle and package, is controllable at all speeds and all diameters of package.

The yarn tension is controlled at all times at a pre-determined value, which is that set at the warp tension stand.

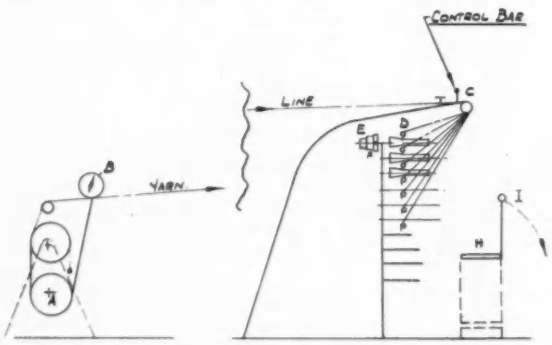


Fig. 4. Principle of operation of Model "N" machine

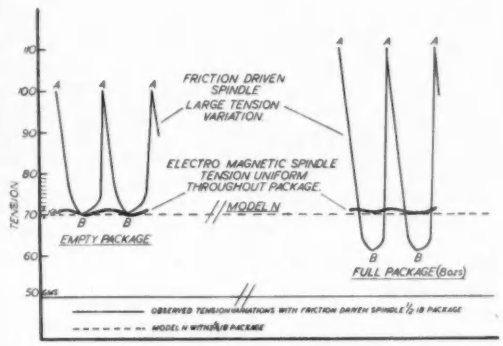

FRICTION DRIVEN SPINDLE
LARGE TENSION VARIATION
ELECTRO MAGNETIC SPINDLE TENSION UNIFORM THROUGHOUT PACKAGE
MODEL N
EMPTY PACKAGE
FULL PACKAGE (8ozs)
TENSION
OBSERVED TENSION VARIATIONS WITH FRICTION DRIVEN SPINDLE ½ LB PACKAGE
MODEL N WITH 2½ LB PACKAGE

Fig. 5B. Graph showing large tension variation of (continuous line) friction-driven spindle producing ½ lb. package and practically uniform tension (dotted line) on Model "N" electro magnetic spindle producing 2½ lbs. package

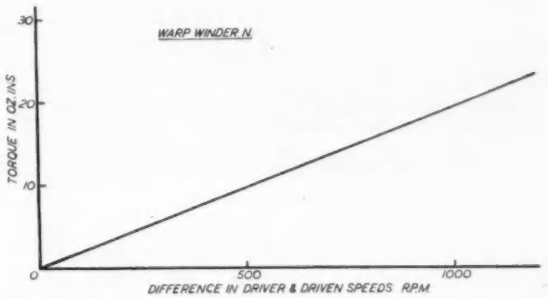


Fig. 6. Graph showing relationship between torque and driver and driven speeds

The yarn tension set at the stand cannot be exceeded, hence a change in package diameter, or in the pre-set tension, could only result in a change in winding speed. This, however, is prevented by the automatic tachogenerator speed control, which immediately corrects any tendency for speed variation from that determined by the position of the control bar. Thus at all times the tension in the yarn is that set at the tension stand, and the winding speed is that set at the control bar.

New Yarn Speed Indicator

Smiths' yarn speed indicator as calibrated 100 - 800 ft./min.

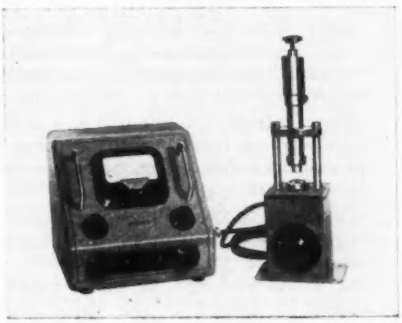
THE instrument illustrated is claimed to be an entirely new approach to the accurate measurement of wool, cotton or man-made fibres on circular knitting machines, because it is completely self contained and requires no outside source of power for its operation. According to the makers, Smiths Industrial Instrument Division, North Circular Road, London, N.W.2, it is invaluable for ensuring that the same quality of knitwear is maintained on a number of machines, since the feeders of each machine can be adjusted to draw the yarn at the same speed. It is possible by using this indicator to maintain a consistent quality of production.

The indicator works on the magnetic principle with an accuracy stated to be ± 1% of full-scale reading. The 1⅝ in. dial has a platform scale which obviates parallax errors and is calibrated 100-800 f.p.m. with subdivisions of 10's of feet, it can also be supplied with calibrations in metres per minute. Each indicator is supplied with a strong leather carrying case complete with operating instructions. The driven wheel is made of hard wear resisting synthetic rubber specially treated to give non-slip properties and the shaft is mounted on ball races. The yarn guides are stainless steel and all other metal parts are cadmium plated. The body and handle are made of a strong aluminium alloy finished in enamel.

Constant Pressure Type Moisture Meter

IN the new constant pressure type moisture meter marketed by Shaw Moisture Meters Ltd., 31 Market Street, Bradford, the makers state that by placing the sample under considerable pressure, good reproducibility of readings is obtained, (e.g. 0·02% moisture content in the case of dry starch). The reading itself is obtained by passing high radio frequencies of over 100 megacycles through the sample. The moisture is immediately indicated on a 5 ins. meter dial and there are readings from complete dryness to 100% water. It is claimed that the readings can be determined to one part in 1,400, and the more dry the test sample the higher is the accuracy obtainable.

Simple and robust, unskilled workers can easily use the meter. No weighing is required. The container is simply filled with the test sample and only a small sample (one or two grammes) is needed. The accuracy is said to be independent of density variations in the sample, also that normal electrolyte variations do not affect the accuracy.



Cleanliness in Textile Mills: Pirnwinding

(*continued from page 390*)

the pirns and reduces breakages of filament weft. The job should be done systematically on all pirns, but especially on types that are troublesome.

Clean Supply Packages

There is no point in paying careful attention to cleanliness of the pirnwinding machines, the pirns, and the pirn boards, if the supply packages themselves are subject to soilage. Handling accounts for a great deal of cheese and bobbin soilage, and pirnwinders using white yarns should be specially instructed in hand cleanliness. If the individual supply packages are initially dusty, and if a layer of yarn has to be stripped before winding commences, the operative's hands will inevitably be soiled, and some dust will fall on to the work area. In such cases the top layers of the dusty supply packages should be run off by ancillary labour at a convenient place away from the machines. Cheeses may be soiled at the outer edges, and care should be taken that ultra-bulky cheeses do not foul the sides of the spindle brackets. Cone bases should be placed on clean surfaces, and the guides should be cleaned regularly. In one automatic pirnwinding machine each cone supply package is totally enclosed in a transparent casing which is kept internally free from dust, tail-ends, etc., by suction. The casing is hinged for easy opening.

The metal cylinder supply packages for nylon yarns are unwound over-end, and a plastic cap, similar to that shown at Fig. 43, is placed over the cylinder to facilitate over-end unwinding. These plastic caps or hats are usually black in colour, and detection of soilage is difficult. There are two oil spots on the cap illustrated, and these may be seen in the photograph because they are placed towards the light, but it is difficult to see such faults in the workroom. It is suggested that light-coloured caps be used in order to make soilage apparent.

If an automatic pirnwinding machine has a magazine supply system where the tail-end of the running cone is tied to the top-end of a cone in reserve so there is no stop for replacing the exhausted cones, care must be taken that the tail-ends are not allowed to become soiled by lying on oily or dusty framework. Magazine replenishment is not favoured for many classes of yarn, because the knot cannot be placed on the top of the pirn chase, and knot-snatching or weft breakages may occur in weaving.

Knotting

Soilage from knotting is a problem in pirnwinding, and where clean work is essential part-pirns are preferred to full pirns with soiled knot areas. It is almost impossible to manually knot dull rayon without some degree of soilage, and if crepe yarns are knotted by inexpert labour, twist variation troubles are added to the soilage fault. A special yarn splicing machine has been devised for piecing crepe yarn without knots and without loss of twist. The machine untwists the two ends (to be spliced) to zero and records the t.p.i. taken out. After splicing, the machine retwists the yarn to the exact degree of twist taken out.

Ordinary knotting is very efficiently carried out by knotting machines which are becoming very popular on account of their efficiency and cleanliness; the knot area is generally clean and the knot is small and compact. At least 12 different types of machines are made to knot the usual types of

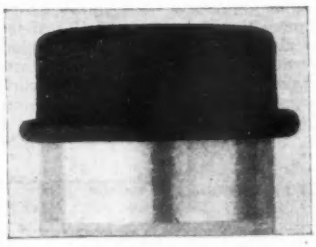


Fig. 43. Soiled cylinder cap

yarn, and three other models are made to make the fisherman's knot for slippery and difficult yarns. The knotting machines require periodic lubrication and cleaning, and this service can be performed by the makers who send a service man to lubricate and overhaul the machines at agreed intervals. Weekly cleaning should be done with a small round brush which is spun between the fingers to collect "fly," fluff and dust. Special attention should be paid to the crosser and crosser-arms, bill blades and spring, and the scissor blades. When fibrous yarns are being knotted, fibres accumulate and stick to oily surfaces, particularly if a gummy oil is being used erroneously. The scissor blades should be maintained in a sharp condition in order to minimise "fly."

A thin stainless oil should be used and applied sparingly, preferably by a dipper rod that applies one drop of oil only. To avoid unskilled and over-lubrication, pirnwinders should not be allowed access to oil cans; the photograph at Fig. 42 shows black oil running down the trigger of a knotter which was over-lubricated by an unskilled person. This oil will eventually soil the finger portion of the trigger and from thence to the operative's hand. Too much oil also prevents correct tensioning of the yarn to be knotted. Parts to be lubricated by one drop of oil weekly include spiral bearings, crosser pins, stripper lever pivot, stripper pivot, and front spacer cam. Just as it is found that lubrication assists a stiff yarn to knit well on latch needles, some operatives find that stiff yarns knot easier if the knotting mechanism is overlubricated. This should not be permitted, and operatives should be instructed that if a knotter is giving trouble with stiff yarns, the machine should be given in for mechanical checking; the trouble may be cured by another type of knotter.

Storage

After pirnwinding, the boards or trays of pirns should be stored in a clean dry place, and if stored in racks these should be clean and dustproof. Rack shelves should not be of the slatted type, because if soilage is scraped off a board bottom by slats on a top shelf, the soilage will fall on to the pirns on boards on lower shelves. If the boards of pirns are kept in trolleys or stillages these should be covered with clean dust sheets if they have to be in store for periods exceeding one day. Weft-store keepers who issue out weft should be specially instructed in hand cleanliness and the proper method of handling pirn boards without soiling the pirns.

T.I. Annual Conference 1959

The title of next year's conference to be held at Scarborough) is "Machinery for Textiles: the Demands of the Industry." It is the hope of the Institute that members will be able to set out what they require in the way of new machinery and that the conference will provide a platform for a critical appreciation of existing equipment. There will also be an opportunity to discuss different types of machines designed for the same task and to observe where advantages exist.

TEXTILE MACHINERY and MILL EQUIPMENT NEWS

A Versatile Range of New Looms

Brief details of the latest C. and K. looms including those for weaving (a) tapes, etc., (b) industrial fabrics, (c) pick-and-pick cloths and (d) a multi-purpose model for weaving a wide variety of yarns

NEW developments and designs in practically every area of specialised weaving from narrow tapes and elastics to wide papermakers' felts are announced by Crompton and Knowles Corporation, Worcester, Mass., U.S.A. Production began in 1958 on their new needle loom (Fig. 1) for tapes and elastics up to 1¼ in. maximum width. Each individual head on this type of loom weaves two pieces of material side by side. Weft carriers operating from the side insert two picks in each shed, which are locked in position on one side by means of a single knitting type needle. Initial machines have operated at over 1,400 sheds per minute which, with two picks per shed, is the equivalent of 2,800 p.p.m. Since two pieces of tape are woven in each head, the total production from each unit is equivalent to 5,600 p.p.m.

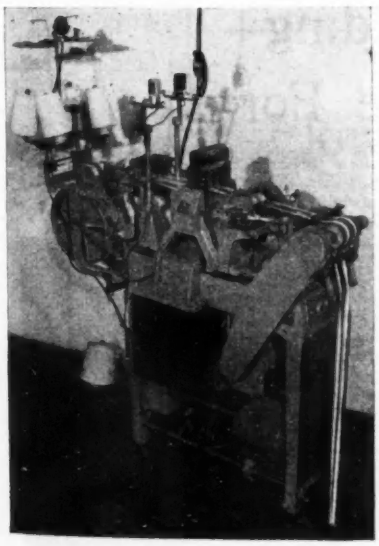


Fig. 1. The Crompton and Knowles needle Loom

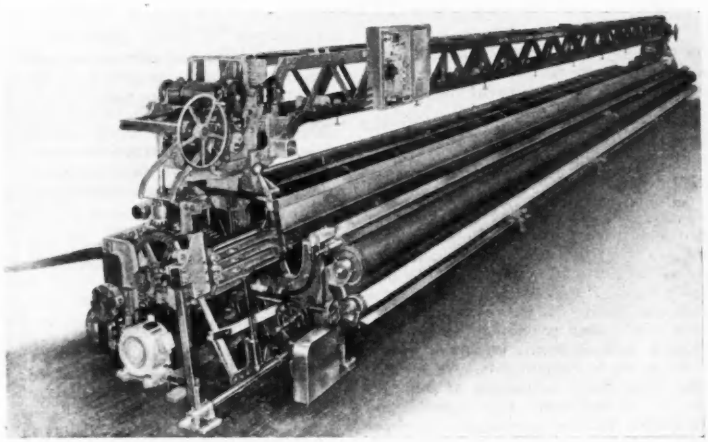


Fig. 2. The Type F-2 650 ins. loom for industrial fabrics, etc.

The needle loom is equipped with a weft stop motion and an electrical stop motion with signal light. The first looms have eight-harness capacity with individual harness cams having a maximum four-pick cycle or repeat. In addition to greatly increased production per operator, quilling is eliminated and weft waste reduced to a minimum. The quality of a wide variety of tapes and elastics has been well above original expectations and fully acceptable commercially.

In line with Crompton and Knowles policy of serving an entire cross section of the weaving industry throughout the world, and in contrast to the development of the needle loom for the narrow fabric trade, the company recently shipped a giant 650 ins. Type F-2 loom (Fig. 2) to weave woollen felts either flat or tubular up to 54 ft. wide in the loom for the production of the type of felts most greatly in demand by the more modern and rapidly expanding paper mills. This latest F-2 loom adequately demonstrates the individual and specialised engineering and research available to clients in this field. At the same time, this loom is only one of many developments in the area of industrial fabrics. The 650 ins. F-2 loom operates at speeds of 29 to 32 p.p.m., using a shuttle 28 ins. long × 2⅜ ins. wide × 2 1/16 ins. high.

One of the interesting features of the F-2 is the electronic magnetic protection. To stop the loom and prevent damage if a shuttle is not going to reach the shuttle box before the harnesses cross, a signal is obtained through two coils strategically located under the race plate, which operate somewhat on the basis of mine detectors. In the shuttle itself, a small strip of transformer iron is placed between the fibre bottom and the body of the shuttle, and this metal in passing over the coils induces a small electric current which is picked up by an electronic panel and converted into electrical energy sufficient to release the electric drive mechanism and apply the electric brake to stop the loom before damage to the warp or shuttle or both occurs. This device is sometimes referred to as "fail-safe" because unless the shuttle passes the coil at exactly the right

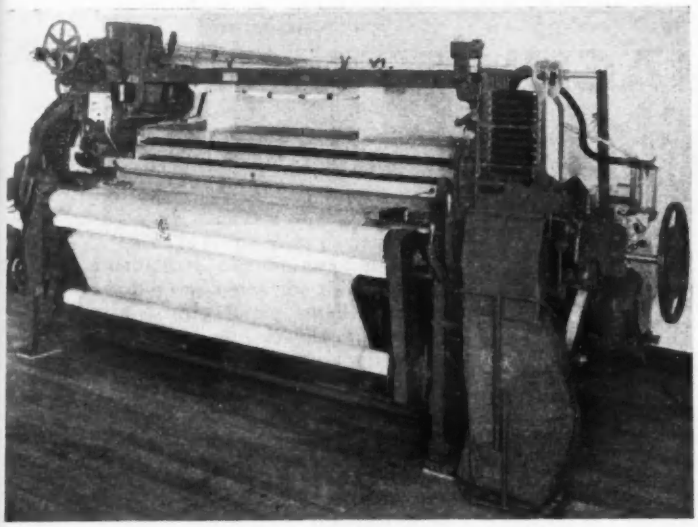


Fig. 3. The C. and K. PAPA loom has automatic bobbin change for weaving pick-and-pick cloths

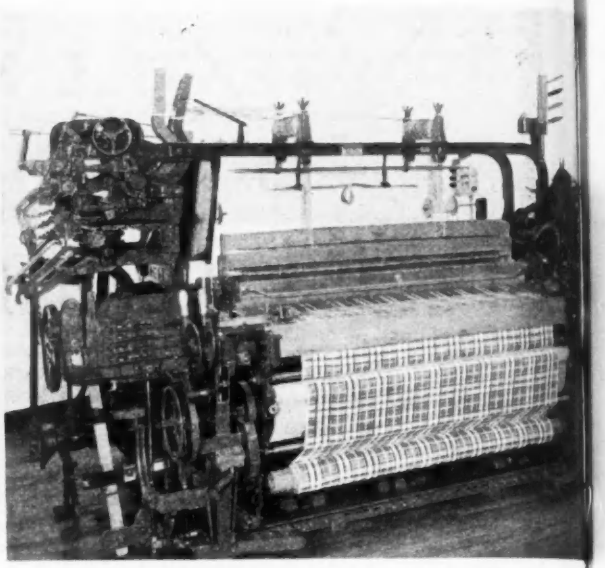


Fig. 4. A multi-purpose loom in widths from 42 to 92 ins.

time the loom will stop. In other words, the loom will stop for power failure, or for an early, or a late, or a missing shuttle.

As a result of Crompton and Knowles continuing effort to contribute to the production of more attractive fabric at more attractive prices, the pick and pick automatic (Papa) loom (Fig. 3) is expected to be a big development in the outerwear, upholstery, and elastic fabrics fields. After years of research and mill trials, this loom is now available to the trade permitting automatic bobbin changing production of many of the pick and pick fabrics which have previously been woven on non-automatic looms at slower speeds and lower work assignments. As a result of the simplified construction of this new loom, it is indicated that speeds and assignments will be comparable to those already established on the company's W-3 Type, automatic bobbin changing 4 × 1 box, woollen and worsted looms. Besides the increased production that may be expected from the Papa loom, considerable interest in the loom has been evinced due to the possibility of stabilising and eliminating unbalanced employment due to style changes from automatic to non-automatic types of fabrics. The stabilised loom assignment obviates the necessity of stopping and re-starting temporary weavers, battery hands, etc. In addition, there are many new features on this loom, not the least being the vacuum weft control to improve the quality of the cloth coming from the loom due to the virtual elimination of drag-ins, jerked-in weft, side lines, etc.

The loom construction also includes new safeguards and conveniences.

Inasmuch as one of the principal features of all C. and K. looms is their versatility and flexibility, the continued growth and acceptance of the multi-purpose loom construction is not surprising (Fig. 4). This family of looms, available from 42 to 92 ins. between swords with a wide variety of shedding, take-up, let-off, and box motions to suit the fabrics being woven, was originally designed around the principle of making available in one loom model all those features required to handle all types of yarn, whether natural or synthetic, spun or filament. An added feature of flexibility in the M-P loom construction is that all box constructions are always prepared for simple conversion at a later date to straight single shuttle operation. With today's fluctuating trade conditions, this conversion insurance assures that a mill will have the most competitive machinery and operating conditions in spite of the future trend of the market.

The U.K. Agents for Crompton and Knowles are A. E. Aspinall Ltd., 16 Cumberland Street, Manchester 3.

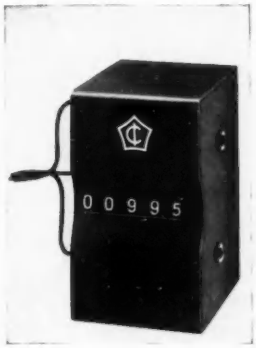
Large One-Piece Polythene Moulding in Bottle Form

THE large 13 gall. polythene container illustrated is an addition to the range of products made by Tool Treatments (Chemicals) Ltd., Colliery Road, Birmingham Road, West Bromwich. It is an all-plastic product, stated to be unaffected by corrosive acids and the tap fitted is worthy of special mention. With this "Black Knight" container the body is specially reinforced and threaded so that the tap can be screwed in to give a perfect, liquid-tight fitting. The all-plastic tap itself is a neatly engineered job designed to give years of satisfactory service but if desired the container can be supplied without tap.

Another feature is the screw cap lid. Apart from the perfect sealing action provided by screwing, there is also an anti-splash rebate inside the lid making the container a very safe method of storing the transporting corrosive liquids. Lugs are provided in the neck for fitting a plastic carrying handle when required. Dimensions of the container: 33¾ ins. high, 13½ ins. dia., 3¼ ins. dia. across neck. Weight 7½ lbs.

A view of the 13 gall. polythene container

Two High Speed Electric Counters



Series 700 Counter.
Counting Instruments Ltd.

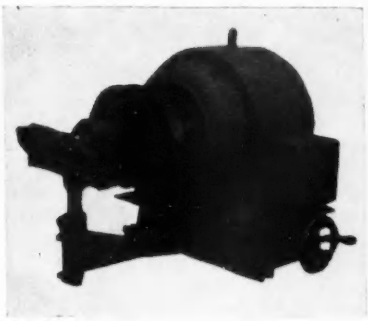
Series 100 Counter.
Counting Instruments Ltd.

THE series 100, 6-figure high speed electric counter announced by Counting Instruments Ltd., 5 Elstree Way, Boreham Wood, Herts., is designed to provide instantaneous reset and long mechanical life. With number wheels and associated pinions moulded from a new low friction nylon, the assembly is actuated by a balanced escapement system set in jewelled bearings. This movement is operated by two small electromagnets spaced around a common armature. Instantaneous reset is obtained by the deflection of a short lever and facilities are provided for electrical reset which will become available in the immediate future. Available for either base or flush panel mounting with a.c. or d.c. supplies, the power consumption is 5 watts approximately with an operating speed of at least 20 counts/sec.

The company's series 700 counter is a self-contained unit with 5-figure presentation. Two escapement type mechanisms operated from separate a.c. or d.c. supplies actuate the number wheels. The first escapement operates to add—at the same time releasing the second—and when subtracting this operation is reversed. Counting + or — is possible up to speeds of 17 per sec., and the design is such that damage cannot occur if both adding and subtracting pulses are supplied at the same time. All working parts are made to precise limits to ensure extreme accuracy of count and long life.

New Variable Speed Unit

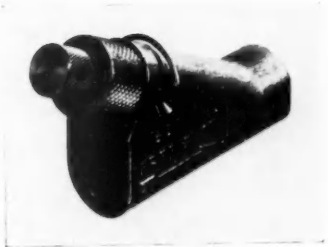
INDUSTRIAL Drives Ltd., 44 Uxbridge Road, Ealing, London, W.5, announce the Druce-Elliot variable speed unit which, with its new type cam bar, has been designed to take full advantage of the fundamentally simple method of transmitting power with a V-belt from a standard electric motor whilst retaining positive drive and high efficiency throughout a wide range of speed ratios. The motor is fixed on a bed plate mounted on guides set at a predetermined angle relative to the horizontal axis of the motor. Actuated by a handwheel in the motor support base, a screw moves the motor away from the driven unit taking the pulley assembly with it. The outer or sliding flange of the pulley opens or closes according to the direction or rotation of the handwheel. These combined movements maintain constant belt tension and alignment. The unit, which has a remarkably wide range of industrial applications is at present manufactured in sizes to accommodate motors from ½ h.p. to 15 h.p.



New Flow Regulators

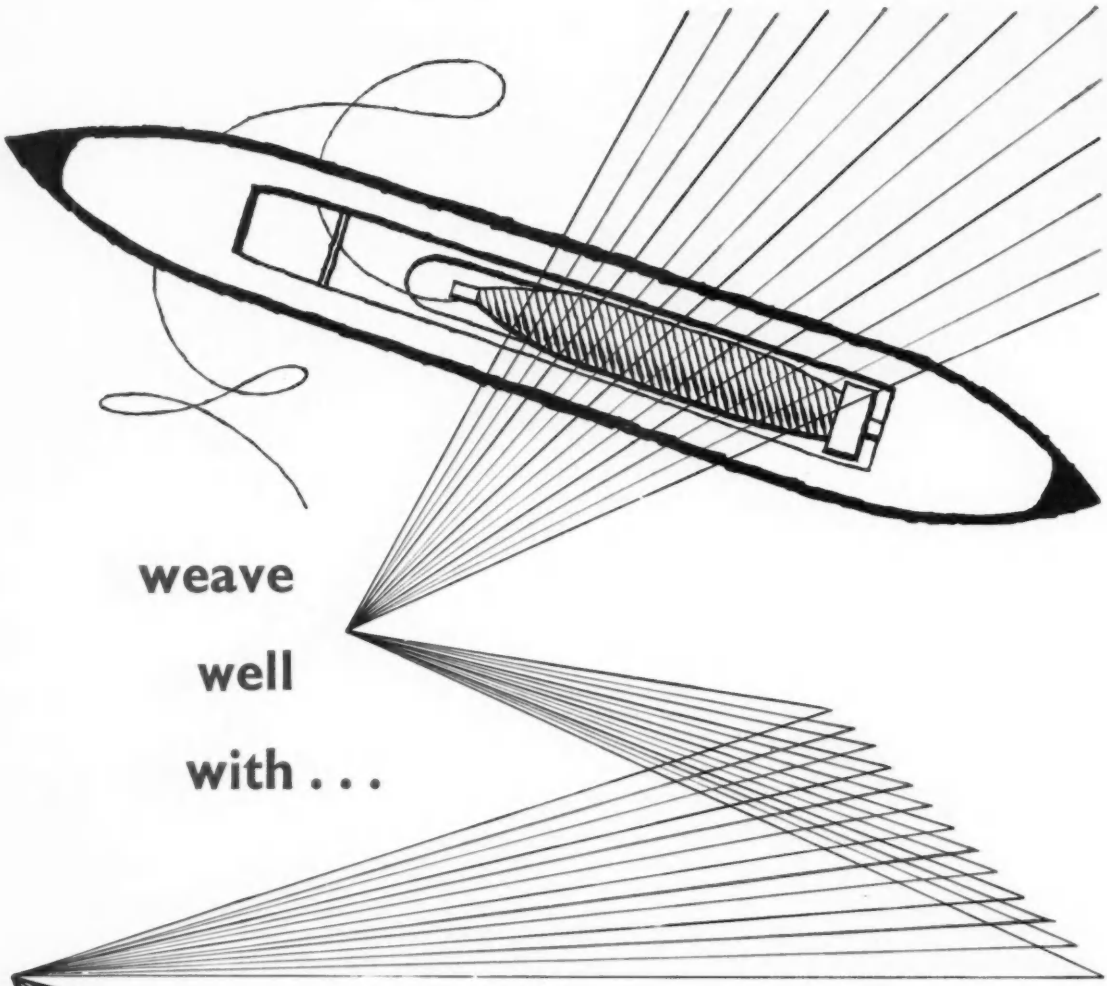
A NEW flow regulator has been introduced by Martonair Ltd., Parkshot, Richmond. It is the ¼ in. B.S.P. S.837 unit which is of particularly neat in-line construction and is suitable for the speed control of pneumatic cylinders up to 40 c.f.m. of free air. The materials employed are brass and manganese bronze and the maximum operating pressure is 150 p.s.i.

A noteworthy feature of this regulator, to which the makers draw attention, is the complex taper of the adjusting needle. Instead of the parabolic curve obtained by the occlusion of an orifice by a needle of simple taper, a curve is obtained, they say, giving approximately 40% increase in flow (and cylinder speed) per turn of the adjusting screw, thus combining precise regulation at low flows with high maximum flow. It is hoped to introduce ½ in. B.S.P. versions of this regulator at an early date.



Electricity and Fuel Efficiency

Equipment and displays illustrating the important part which electricity plays both in the fields of fuel economy and productivity will be seen on the stand (No. 6D) E.D.A. at the Industrial Fuel Efficiency Exhibition at Olympia, September 24—October 3. Industrial applications of electricity forming the exhibit will range from a high sensitivity thickness gauge, an electronic smoke density meter for indicating when a factory chimney is emitting black smoke and in danger of breaking the law, a battery electric truck for works use, an electrically lighted bottle inspection device. A selection from the extremely varied range of electric canteen appliances available will be on view, also the latest forms of electric space heating appliances in the form of block storage heaters which store by night and heat by day. Finally, examples will be exhibited of the various ways of using electricity for under floor warming.



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THE TEXTILE
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Problems Concerned with the Soiling of Textile Fibres and Materials

Finishing textile materials so that they repel dirt would greatly increase the usefulness of many types of fabrics. In the future soil-resist finishes may become quite as important as the present crease-resist and shrink-resist finishes

By B. C. M. DORSET

OVER many years the soiling of fabrics and garments has been considered almost solely from the viewpoint of devising methods and products for removing such soil so as to leave the textile material purified and in many cases a good white or a bright colour. Thus much attention has been given to the discovery of improved detergents and the design of improved machinery for applying detergent liquors so as to secure purification most efficiently yet without damage to the goods being processed. It is only comparatively recently that serious consideration has been given to methods for treating textile materials so that they will repel rather than attract soil and shed such soil rather than retain it. During the past five years or so a great deal of research has been carried out with a view to discovering fibre and fabric treatments so that they may give useful resistance to soiling and some very interesting results have been obtained. Yet these investigations have at the same time revealed several problems and difficulties.

It is possible from a theoretical consideration of the matter to foresee various ways by which fibrous materials can pick up soil, how their physical form can give them the power to retain it, and how modifying treatments might be applied to hinder soil pick-up and soil retention. But actual investigations with different types of fibres and different constructions of woven and knitted fabric have shown that these theoretical considerations are not always in accord with experimental observations and just at the present time there is need for much more experimentation than has so far been carried out. Several examples of this will be quoted in the course of this article but just now a few may be given.

Differences in Fibres

It would be assumed that since a raw cotton fibre contains waxy greasy substances in its surface it would then more readily pick up soil than a cotton fibre which had been bleached but this is not so. Again, mercerisation of cotton fibres makes them round and smooth and it could be assumed that this would make the fibres less liable to pick up soil than non-mercerised fibres having a rough pitted and striated surface yet the experimental results are otherwise. From another point of view it would be assumed that the presence of static electricity on a textile fibre would increase its power to pick up soil yet while this is true for several fibres it has been found that nylon as one of the most easily electrically charged fibres is the least liable to become soiled.

Interest in the way in which textile materials pick up soil has been largely stimulated by recent developments in the manufacture of carpets. It has always been considered best to make carpets from wool yarns and experience has shown that not only does wool wear well under the conditions peculiar to carpet use but that wool carpets are acceptably resistant to soiling. Much cheaper carpets are made from cotton but these definitely soil much more rapidly. With the introduction of tufted carpets there has been a greater use of other than wool yarns and to a considerable degree wool has been replaced by cotton, viscose rayon, nylon, and at one time by the regenerated protein fibre "Ardil." It soon became recognised that these non-wool fibres were subject to soiling more than wool and the causes were sought. One important point discovered was that the presence of oil either in the non-wool fibre or in the carpet-backing fabric promoted soiling. But of course the physical properties of the fibres themselves influence their soiling behaviour. Thus many attempts have been made to discover treatments which will lower the soiling susceptibilities of the different fibres. It cannot, as yet, be said that any fibre has been produced superior to wool in this respect but certainly much new knowledge has been gained.

But the soiling properties of fibres are not alone of importance in the production of carpets. Great interest is now being taken in the tendency of many types of textile goods to soil during use—for example, upholstery and curtain materials. Even interest is being shown in the soiling properties of shirting and dress goods since if these can be made easier to maintain in a clean fresh state they will give

better consumer satisfaction and make laundering less necessary.

The soiling characteristics of a textile material, say a fabric, can in part be attributed to the soiling characteristics of the particular type of fibre present and in part to the surface structure of the fabric more or less independent of the fibre type. Soiling may be further influenced by any finishing substances present in the fabric and also by any particular form of mechanical finishing to which it has been subjected. The investigation of these factors singly and together is quite a complex matter. This is more clearly recognised when it is recalled that investigations of soiling must involve the artificial soiling of fabrics and reliable methods of estimating soil pick-up and soil removal. Another point is that the amount of soil present in a fabric cannot always be assumed to be proportional to the lowered reflectance of light from it. The application of pressure can assist the retention of soil which has fallen on a fabric and it follows that the resilience of the fabric can also play a part in the soiling.

As mentioned earlier, in any investigations of fabric soiling it is necessary to be able to apply an artificial soil comparable to natural soil and then be able to determine the degree of soiling before and after any cleaning treatment. Many types of artificial soil have been proposed and several of these contain carbon black because of its powerful effect on light reflectance; other coloured or colourless inorganic fillers may be present but in general it is essential to have an oil or grease present because this can influence the binding of the soil to the fabric surface. The following composition of an artificial soil used in the laboratories of the American Cyanamid Company (see Salsbury, Cooke, Pierce and Roth; Amer. Dye. Rep., 1956, **45**, 190) for testing their anti-soiling agent Juvenon R is illustrative—

Ingredient	Amount
Peat moss	38%
Cement	17
Kaolin clay	17
Silica (through a 200-mesh sieve)	17
Carbon black	1·75
Red iron oxide pigment	0·5
Mineral oil (Nujol)	8·75

The particle size is a matter of some importance since it determines how far the soil particles can enter into the interstices of fabrics and the crevices known to exist in fibre surfaces. The above artificial soil was compared in this respect with some natural soil obtained by the vacuum cleaning of carpets with the following results:—

Particle size	Natural soil	Artificial soil
0·1 to 0·2 microns	13·3% by weight	0 % by weight
0·2 „ 0·5 „	0 „	12·8 „
0·5 „ 1·0 „	3·5 „	16·7 „
1·0 „ 1·2 „	0 „	0 „
1·2 „ 2·2 „	11·7 „	19·7 „
2·2 „ 3·3 „	66·0 „	0·2 „
3·3 „ 70 „	5·5 „	45·6 „
70 „ 150 „	0 „	5·0 „

It is obviously difficult to prepare an artificial soiling composition exactly comparable in particle size to that of natural soil, but in spite of this the effectiveness of the artificial soil may be satisfactory.

Soiling Methods

There are various methods for applying soil to a piece of fabric. Thus it may be printed on the fabric or blown on with a sprayer; alternatively the soil may, in dust form, be blown into the surrounding atmosphere and then fall lightly on the fabric. It is optional whether or not the freshly soiled fabric should be pressed with the aim of forcing the soil into the fabric interstices. Another method of soiling which is favoured by some workers is that of applying an artificial soiling composition as evenly as possible within a rotating ball mill (the axis is horizontal and the direction of rotation is frequently but regularly reversed) containing a suitable number of steel balls of say $\frac{1}{2}$ in. dia. By running such a machine for about twenty or more minutes with the fabric samples evenly spread over the inner periphery of the rotating horizontal cylinder the balls strike the soil into the fabric thus spreading it fairly evenly.

However the fabric is soiled it then has to be subjected to some simple treatment to remove non-adhering soil —simple stroking with the upholstery attachment of a home vacuum cleaner is a satisfactory method. Thus the fabric taken from the ball mill and suitably soiled can be stroked several times in opposing and cross directions and finally in such a direction so as to lay flat any pile or fuzziness of surface. Comparison may then be made of the degree of soiling before and after such cleaning to give a measure of the soiling characteristics of the fabric.

It is possible to label soil by means of a radioactive isotope and strontium 89 has been used for this purpose. Then the amounts of soil present in the fabric before and after cleaning can be determined by conventional radioactive techniques. Soil extraction methods are not generally convenient or accurate. Changes in light reflectance are perhaps the most satisfactory if use is made of the Kubelka-Munk equation (established by Kubelka some ten years ago, see J. Opt. Soc. Amer., 1948, **38**, 448) which is based on the observation that any change in the degree of soiling is linearly related to the corresponding change in the light reflectance of the fabric such as can be accurately measured by means of reflectometer apparatus now commonly available. The Kubelka-Munk equation which is now widely accepted is as follows:—

$$\frac{(1 - R_s)^2}{2R_s} - \frac{(1 - R_c)^2}{2R_c} = KW_s$$

in which R_c is the reflectance of the unsoiled sample, R_s is the reflectance of the soiled sample, W_s is the weight of soil present in the fabric, and k is a constant. Certain conditions have to be fulfilled in the experimental procedure when using this equation.

In the above equation the product kW_s is often termed the Kubelka-Munk Index (KMI)—an increase in the value of this Index signifies an increase in the degree of soiling of the textile material. Fig. 1 (taken from a paper by Porter, Peacock, Tripp and Rollins; J. Text. Res., 1957, **27**, 833) shows the linear relationship between the amount of soil retained in bleached (or non-bleached) cotton fabric and the Kubelka-Munk Index as obtained in some artificial soiling investigations.

Turning from these preliminary observations about soiling and the determination of the degree of soiling reference can be made to some very interesting investigations made by the

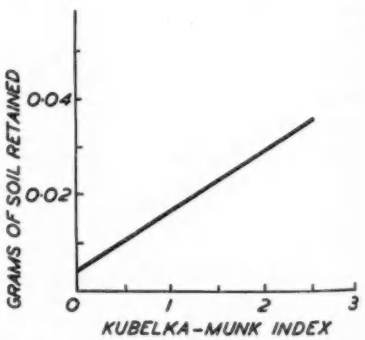


Fig. 1. Relationship between the Kubelka-Munk index and the soil retained by cotton fabric

same workers as quoted immediately above in connection with ordinary, bleached, and mercerised cotton fabrics. Firstly it may be shown how it is possible to increase the resistance of such fabrics to soiling by suitable pre-treatment as for example by first depositing on the fibres a commercial anti-soiling product which is a colloidal silica-alumina preparation.

Fabric samples consisting of bleached cotton were either used as such or first treated with an agent likely to have an anti-soiling action and they were then soiled with compositions based on carbon black, wood charcoal, and animal charcoal using the soiling apparatus referred to above. In one set of experiments 2% of starch and in another 4% of the commercial alumina-silica agent was applied to the fabric before the soiling. The soiled fabric samples were then vacuum cleaned until no further decrease in the amount of soil retained was evident. Reflectance measurements were then employed to determine the residual soil. Attention was given to the particle size of the carbon soilants applied.

The results obtained are shown graphically by the curves in Fig. 2. It is evident that the soil retention properties of the bleached cotton fabric is not appreciably influenced by a pre-treatment with starch but are much reduced by the presence in the fabric of 4% of the alumina-silica agent. The carbon black soilants had different particle size ranges—carbon black (90 to 800 Angstrom units) and wood charcoal and animal charcoal (greater than 1,000 Angstrom units). The curves indicate that the soiling produced rises to a maximum as the particle size increases up to about 500 Å. and thereafter diminishes but this result is less conclusive than may be suggested by the curves since

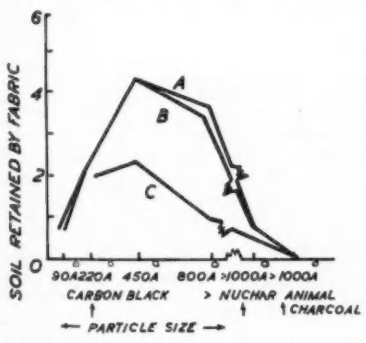


Fig. 2. Curves showing the soiling of (A) untreated, (B) 2% starch treated and (C) 4% alumina-silica treated cotton fabrics, with carbon black soilants of different particle size values

electron micrographs of the soiled cotton fibres indicated some agglomeration of the carbon particles during the soiling.

Test Results

In view of the striking anti-soiling action of the alumina-silica agent further experiments were conducted in which a silica soil retardant used in the pre-treatment was employed in forms having different particle sizes from 170 Å. to 630 Å. Also, four types of artificial soil were applied. The results are shown below:—

Average size of silica particle in soil retardant	Kubelka-Munk ratios for soiling produced with — A Nuchar decolourising charcoal	A carbon black	A synthetic soil
170 A	0·20	0·06	0·74
300 „	0·46	0·23	0·73
630 „	0·58	0·44	0·97

Note: The Nuchar soil had a particle size of about 2,000 Å, the synthetic soil (of the composition given previously in this article) had a carbon black particle size of 800 Å although comprising only 1·75% of the soil mixture, and the carbon black soil had an average particle size of 450 Å. The amount of soil applied to the bleached cotton fabric samples was in each case 2%.

It is further to be noted that in the above table the degree of soil resistance of the fabrics is denoted by the Kubelka-Munk Index ratio (not the KMI itself). This ratio number represents the ratio of the KMI of a treated fabric to that of an untreated fabric so that if the ratio is less than unity it indicates increased soil resistance as a result of the soil retardant treatment while if the ratio is greater than unity then a decrease in soil resistance is indicated.

Consideration of the above results at once shows that the silica pre-treatment of the bleached cotton fabric has a greater effect in the case of the Nuchar and carbon black soilants (particle size 2,000 Å. and 800 Å. respectively) thus indicating that the effect is greater as the particle size of the soilant is greater. Conversely, the soil retardant effect of the silica is greater as its particle size is smaller.

The above results are applicable to cotton fabric whether it is in the grey state, bleached, or mercerised. This is rather surprising since if fibre surface roughness assists soiling it would be assumed that the mercerised cotton fabric would be less liable to soiling—it is generally held that by mercerisation the twisted flat, ribbon-like ordinary fibres are converted into smooth cylindrical fibres. In this connection it is useful to recall some earlier investigations about the surface of modified cotton fibres carried out by Tripp, Moore and Rollins (J. Text. Research, 1957, **27**, 427). These workers, using an electron microscope and a method of taking an impression of cotton fibre surfaces by means of polystyrene film have found that mercerisation produces no appreciable smoothing out of the rugosities of cotton fibres. An ordinary cotton fibre has a highly ridged surface with the ridges about 0·5 micron deep and with about the same distance between the ridges; many of these ridges are about 10 microns in length and they spiral around the fibre at an acute angle (20° to 30°) to its axis. Actually this ridged nature is a kind of reflection of the spiral fibrillar structure of the cellulose layer beneath the primary wall of the fibre. There are also numerous pits or cavities in the surface of each cotton fibre.

In mercerisation most of the gross cavities of the cotton fibre are removed. While in the mercerising liquor (say caustic soda of 20%) a 100% thickening of the fibre occurs so that there is exerted great pressure by the secondary wall upon the primary wall of the fibre and this is sufficient to cause appreciable fusion of these two walls—it is thus that the rough spiral character of the secondary wall is impressed into the primary wall to give this a roughness which would not be anticipated in a mercerised fibre. These changes have been observed with cotton when the mercerisation has been carried out both in the laboratory and on the large scale. The similar soiling properties of ordinary and mercerised cotton materials can thus be adequately explained.

Porter, Peacock, Tripp and Rollins

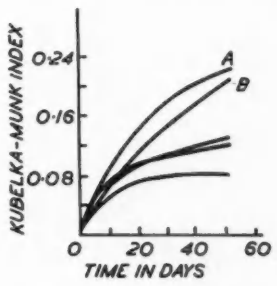


Fig. 3. Curves showing the rates and degree of soiling by foot traffic of bleached cotton fabrics. (A) Untreated cotton fabric. (B) Cotton fabric pretreated with 2% dialkyl fectone. (C) Cotton fabric pre-acetylated. (D) Cotton fabric pre-acetylated and further treated with 2% of colloidal silica. (E) Pre-acetylated and further treated with 2% of colloidal silica alumina

have carried out a very interesting investigation of the soiling of bleached cotton fabrics (using a synthetic soiling composition and the ball mill apparatus previously described) which had first been pre-treated with substances having a potential soil retardant action. The results obtained are shown below:—

Pre-treatment of Cotton Fabric	Kubelka Munk Index Ratios
Perfluorodecanoic acid, 0·2% in n-hexane	0·10
Hard acrylic resin dispersion, 5% add-on	0·16
Mercerised, and colloidal silica, 7% add-on	0·23
Colloidal silica-alumina, 7% add-on	0·25
Colloidal silica, 7% add-on	0·26
Acetylated, and colloidal silica, 7% add-on	0·38
Dialkyl ketene, 2% add-on	0·41
Acetylated, and colloidal silica-alumina, 2% add-on	0·41
Silicone water-repellent finish, 2% add-on	0·44
Methylolmelamine creaseproofing agent, 8·2% add-on	0·60
Carboxymethyl cellulose, 2% add-on	0·71
Commercial mercerisation	0·74
Polytetrafluoroethylene dispersion, 5% add-on	1·97
Starch, 2% add-on	0·98
Cyanoethylation, to give 4·5% combined nitrogen	1·01
Decrystallised to give 60% residual crystallinity	1·03
Slack mercerised	1·34

Obviously the degree of soiling of the treated bleached cotton fabrics can be much influenced by pre-treatment —a pre-treatment with perfluorodecanoic acid can be very effective as a soil retardant while a pre-treatment with polytetrafluoroethylene can act in an opposite manner and increase the tendency of the cotton fabric to become soiled. It is seen that acetylation and cyanoethylation of the cotton does not improve its resistance to soiling.

Some parallel investigations were carried out in which the pre-treated cotton fabrics were incorporated in rugs laid down on the floor in office passageways and the rate and degree of soiling observed from time to time. The results are shown graphically in Fig. 3 where it is revealed that the acetylation of the cotton fabric retards soiling and that this effect can be increased by additional treatment of the cotton fabric with colloidal silica or silica-alumina compositions. The retardation of soiling with these latter compositions is more effective as the amounts applied are increased from 2% to 7% as shown by the curves in Fig. 4 which are also instructive as showing how the rate of soiling a carpet material is likely to decrease after a few days of use.

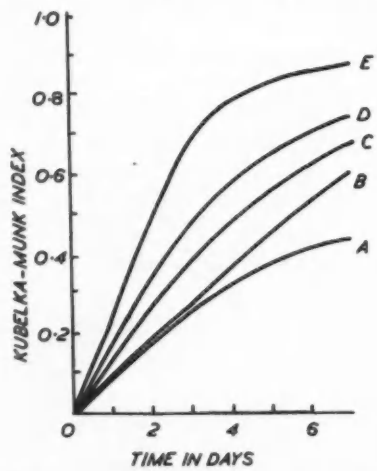


Fig. 4. Curves showing the extent and rate of soiling of cotton fabrics (treated and untreated) when exposed as a floor covering. (A) cotton fabric pre-treated with 7% colloidal silica-alumina. (B) 7% colloidal silica. (C) 2% colloidal silica-alumina. (D) 2% colloidal silica. (E) Untreated

Significant is the fact that by application of silicones and a *soft* acrylic polymer to cotton fabric no appreciable improvement in retarding soiling was obtained. This result is in spite of the fact that an electron microscope view of the treated fibres showed that their surface had been covered by a smooth continuous film either of the silicone or the acrylic polymer thus obliterating all trace of the natural corrugations and making the fibre surfaces smooth. By contrast, acetylation especially about 20%, smoothed the cotton fibre surfaces and also retarded soiling while cyanoethylation and carboxy-methylation which also smoothed the fibre surfaces failed to produce a lowered tendency to pick-up soil. It is to be noted that a *hard* type of acrylic polymer can retard soiling.

As already noted the colloidal silica and silica-alumina compositions are quite good soil retardants and their effect is greater when applied in the higher amounts. Examination of the cotton fibre surfaces following their application showed that such surfaces (in spite of a certain amount of filling-up of the natural corrugations) were not smooth—they had a peculiar roughness; thus because soil pick-up was retarded it cannot be considered that fibre smoothness is a primary quality governing soiling.

Recently a new inorganic soil retardant has been marketed under the trade name of Juvenon R (American Cyanamid Co.) and it is claimed to be highly effective on most types of textile material. It is applied by simple impregnation methods including steeping and padding techniques and sometimes in conjunction with aluminium sulphate which has a softening action on the treated material. Juvenon R has been found to give good soil retardant effects on wool, wool-viscose rayon mixtures, nylon, cotton, and smooth delustred viscose rayon fabrics when applied in 1% concentration, but while it is recommended to use this concentration for viscose rayon materials it is indicated that a better result is obtained by the use of 2% for the other fibres. Juvenor R has no appreciable effect on the electrical properties of viscose rayon, wool, acetate, nylon and "Dacron" (the equivalent of "Terylene") fibres although it markedly improves their resistance to soiling. This affords evidence to support those workers who consider that electrostatic charges in textile materials play but a small part in soiling—this in spite of the fact that it has been found that about 70% of airborne dirt is electrically charged.

Soil Retardant Substances

From a consideration of the soil retardant effects of such substances as Juvenon R and also from the use of various substances whose main action appears to be a filling-up of the fibre rugosities or surface irregularities it would appear that these soil retardants act by setting up a soil barrier—they occupy sites which could be occupied by soil. Many substances including iron oxide, kaolin clay, aluminium acetate, barium sulphate, calcium sulphate, silicon oxide and aluminium oxide have been shown to be effective in this manner but it is necessary for commercial use to make careful selection of the substance to be employed. Thus it is necessary that the soil retardant shall adhere tenaciously to the textile material and not readily dust off and lose its effect. It is also necessary that the soil retardant should not confer colour on the textile material or adversely affect its handle and other physical properties. The oxides of aluminium and silicon appear to satisfy these requirements. Florio and Mersereau (J. Text. Research, 1955, **25**, 641) have recorded results as shown by the curves in Fig. 5 which show the efficacy of a mixture of these oxides in protecting a carpet from soiling during its use—the soiling is indicated by a lowering of the Munsell colour value. The curves in Fig. 5 show how an untreated carpet became soiled after some 3,000 foot-treads to the same degree as a carpet treated with about

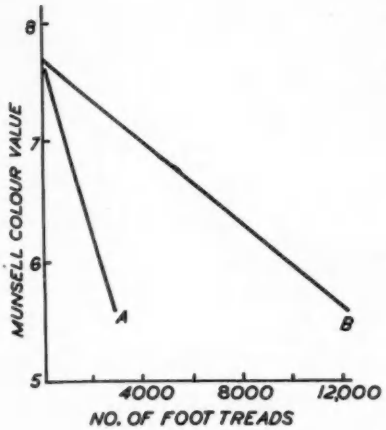


Fig. 6. Curves showing the resistance to soiling of carpets (A) untreated, and (B) pre-treated with a colloidal alumina-silica soil retarding composition. The soiling is inversely proportional to the Munsell colour value

1% of the aluminium and silicon oxides does after 12,000 foot-treads.

Recently it has been discovered that textile materials can be given a repellency towards oil by suitable treatment with the new fluorocarbon chemicals which have become available. It has been mentioned above that oil can act as a binder of dirt in textile fabrics and so it might be anticipated that some of these fluorocarbon chemicals might act as soil retardants. This idea has been investigated by Tripp, Clayton and Porter (J. Text. Research, 1957, **27**, 340) and they have made particular examination of perfluorodecanoic acid which can conveniently be applied to textile materials in the form of a solution in n-hexane although the alternative use of a ½% solution in water also containing sodium acetate is satisfactory.

When such a fluorocarbon chemical is applied to cotton fabric the fibre surfaces are apparently unchanged—there is no filling-up of the surface irregularities such as occurs when inorganic particulate substances are applied. It is believed that any soil retardant effect resulting must arise from a lowering of the surface energy of the fibres by a replacement of the hydroxyl (OH), hydrogen (H), and carboxyl (COOH) groups by CF_3 and CF_2 groups. It can be foreseen that this kind of soil retardant treatment might be much more satisfactory from the viewpoint of better preserving the original characteristics of the textile material but this field has yet to be fully exploited.

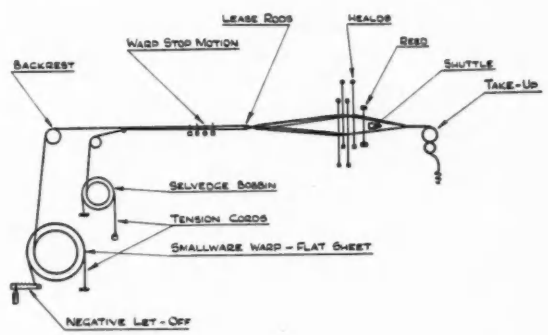
From what has been stated above it will be evident that there are great possibilities in this finishing of textile materials so that they may repel dirt. It would greatly increase the usefulness of many types of fabrics and garments if they could be given a tendency to remain clean during use. Investigation of this aspect of textile finishing has only just commenced but it can be foreseen that in the future soil-resist finishes may become quite as important as the present crease-resist and shrink-resist finishes.

Smallware Weaving of Nylon Filament Yarns

NYLON yarns for smallware weaving are provided gummed, or sized, for warp requirements and normal yarns are supplied for weft purposes.

Warp Yarn.—To obtain good weaving efficiency it is essential either to gum, or size, the yarn to protect the filaments during weaving. Single end sized yarns are provided on cone ready for warping, with either 5 "Z" or 7½ "Z" turns per inch according to the denier. These yarns are supplied non-twistset as type 141, or type 144.

Denier	*Tension (Average)*
45/15/7½ "Z" type 140	12 grams
60/20/7½ "Z" type 140	18 grams
100/34/5 "Z" type 140	25 grams
150/50/5 "Z" type 140	30 grams
205/34/5 "Z" type 140	35 grams



Warp tensioning arrangements in the loom

Weft Yarn.—Nylon yarns with either 5 "Z" or 7½ "Z" turns per inch according to the denier, are quite satisfactory for quill winding and weaving. These yarns are supplied non-twistset on cone as type 140, ready for winding.

Winding and Warping

When quill winding nylon yarns it is necessary to use a short, smooth yarn path with uniform tension. The cone should be firmly supported in correct alignment with the tension device. An automatic tension compensator is recommended, but a gate tension device may also be suitable. The tension units and guides should be of matt chrome finished metal or ceramic guides with a low co-efficient of friction may be used.

A winding tension of 0.3 grams per denier, or less should be used. A suggested range of winding tensions for each denier is as follows:—

A direct warping system to prepare flat sheet warps dressed end and end is suggested. The cones of yarn should be firmly positioned on the creel in correct alignment with the tension units and warped with low uniform tension.

Weaving

Flat sheet warps are recommended for nylon smallware beams to obtain the best weaving conditions and highest fabric quality. The beams can be accommodated at the rear of the loom in the base of the frame, giving the lightest and cleanest conditions for weaving. Tension may be applied to the warp yarn by means of cord friction in the groove of the flanges of the beam, and controlled by either weights and levers, or tension springs. The flat yarn sheet is passed over a metal, or wooden back-rest roller to the lease-rods and warp stop motion, if fitted, dispensing with the use of dividing reeds. Low uniform tension of the weft yarn during weaving is required with only a light spring control being applied. Dyed yarns for warp purposes should be single end sized after the throwing and dyeing processes of the yarn.

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Application of Sulphur Dyestuffs to Yarn and Piece Goods*

Consideration of the important factors involved in jig dyeing, package dyeing, dyeing yarn in open vessels, the sulphide method, soda/hydros method, pad/jig and pad/steam, also speciality uses for Sulphosol dyes

By W. E. WOOD†

THE number of sulphur dyes is considerable and nearly 800 are listed in the second edition of the Colour Index recently published by the S.D.C. and the A.A.T.C.C. and, as shown in Table 1, these can be divided into six categories by virtue of their application methods. This paper is

Table 1

Group	Class
I Insoluble in water	(1) Conventional
	(2) Dispersed or specialised conventional
II Soluble in water	Substantive in water
	(3) Liquid
	(4) Leuco
	(5) Mixtures with sodium formaldehyde sulphoxylate
	(6) Non-substantive in water

concerned with the dyes in classes 1, 3 and 6, the methods used for their application and the precautions which should be taken during this application.

The material to be dyed should be as clean as possible when using sulphur dyes. Cotton piece goods should be scoured and efficiently desized unless it is known from experience that the material is already satisfactory when received. Efficient desizing is essential for good penetration and in certain cases it may be necessary to treat the material with dilute caustic soda to increase the uptake of dyestuff and so give an apparent increase in the depth of shade produced by dyeing. If the material has been bleached all traces of bleaching agent must be removed as traces of hypochlorite can cause lighter patches on dyed pieces, particularly with corduroys and tightly woven materials. For cotton yarn, desizing or caustic treatment are not always necessary but if its quality is doubtful, particularly with condenser yarn, it should be given a light scour and washed well before dyeing. Viscose should be desized if heavily sized, but it is best to have it dry to enter into the dyebath due to the swelling which occurs in alkaline solutions and hinders penetration of dye liquor.

Conventional Sulphur Dyes and Liquids

The dyestuff should be pasted with a little warm water to which a small quantity of wetting agent can be added with advantage. The requisite quantity of sodium sulphide is then added with sufficient hot water to ensure complete solution and the dyestuff then dissolved by boiling for about 5 mins. It is far better to use a separate dissolving tank rather than try to dissolve in the bottom of the dyeing vessel. Pouring boiling water on to a mixture of dyestuff and sulphide in a bucket, then stirring and hoping the colour will be completely dissolved, is a practice which invites trouble. All conventional sulphur dyes should be dissolved by boiling properly and it is true to say that 80% of unsatisfactory sulphur dyeings arise from lack of care during the initial stage of dyebath preparation.

Attention should be paid during dissolving to the maximum solubility of the dyestuff particularly when heavy shades are being dyed. The maximum solubility figure should not be exceeded except for dyes known to go into solution on further dilution. Examples are Sulphol Brown GD, Sulphol Violet 2B, Sulphol Green B, Sulphol Dark Brown RWD conc, and the Sulphol Blacks. Other dyes, notably Sulphol Claret RL, the Sulphol Brilliant Greens and the Sulphol Navy Blue types will not dissolve in concentrations which exceed their maximum solubility figure. For example, a navy blue shade on cotton drill may require 12% Sulphol Dark Blue L 100%. To dye a batch weighing 200 lbs., 24 lbs. of dyestuff would be required together with 48 lbs. of crystalline sodium sulphide. This dyestuff has a maximum solubility figure of 30 grams/litre or 3 lbs. per 10 galls. and it is therefore necessary to dissolve the dyestuff in at least 80 galls. of water which in practice may mean that the jig will need to be filled to the normal dyeing level when preparing the dyebath. This is an extreme condition although frequently met with in practice in cases when low liquor ratios occur, or heavy shades are to be dyed.

The concentration of sodium sulphide present in the dyebath is also important when pale shades are to be dyed or when mixtures of sulphur dyes which differ widely in their rate of strike are being used. In the first instance, the concentration of crystalline sodium sulphide should not drop below 5 grams/litre or 10 grams/litre when dealing with mixtures. For all practical purposes Sulphol khakis should be regarded in this second class, as should mixtures of Sulphol yellows, oranges and yellow browns with Sulphol red browns, or blacks. For mixtures such as these temperature control can assist in giving level results. The material should be entered below 40°C. and after working at this point for a short time the temperature should be slowly raised to that recommended for the dyestuff concerned. Gradual salt additions can then begin, and when these are complete the dyeing is allowed to continue until the required shade is obtained.

Frequently the treatment which sulphur dyed goods get after dyeing is the cause of unsatisfactory results. Air oxidation would be permissible if it could be ensured that all parts of the batch were allowed equal access to the atmosphere, but in practice this is impossible. It is therefore better to wash-off the goods as soon as possible using plenty of water and to give a final wash with warm water. This ensures that the alteration of shade normally expected with sulphur dyed materials will not be increased by residual sodium sulphide.

After-treatment of Sulphur Dyeing

Because of the ageing properties associated with sulphur dyes due to oxidation, after-treatments given are often with oxidising agents. Sodium perborate and other per-salts at a concentration of 1 gram/litre give increased brightness to many sulphur dyes, notably the blues, and a slight sour with acetic acid following this ensures that the wet fastness is not impaired. Acetic acid treatment alone is necessary with Sulphol Prune B and other Sulphol red browns to bring up the true redness. It is useful in neutralising any excess sulphide which may be present in material after dyeing. Potassium bichromate and acetic acid treatment at a concentration of 1 gram/litre of each is also given to stabilise the final shade of sulphur dyed goods and at the same time has the effect of improving wet fastness. 1 gram/litre of copper sulphate may be added to this treatment and has the effect of improving the light fastness of many sulphur dyes. It is extremely important however, that no copper sulphate should be added to an after-treatment bath which still contains traces of sodium sulphide. The bath should be made to pH7 with extra acetic acid before the required amount of acid and bichromate is added. Then, and not before, the copper sulphate

* *A paper given recently to the Rochdale branch of the Guild of Calico Printers', Bleachers', Dyers' and Finishers' Foremen.*

† *James Robinson and Co. Ltd., Huddersfield.*

can be added without fear of precipitating copper sulphide and the risk of spoiling the final results.

Fixing agents of the permethylated polyethylene imine type can be used to improve wet fastness with little effect on the shade. Resin type anticrease finishes also have the effect of improving the wet fastness. The fastness to light is improved and the effect on the shades is normally in the direction which is taken by more gradual ageing.

Jig Dyeing

Better penetration can be achieved by entering the material dry, but the success of this method depends on the material and its preparation and cannot always be recommended. Viscose, of course, should be entered dry whenever possible. Even batching is essential to avoid bronzy selvedges and all additions to the jig should be made at the ends. The major problem facing the jig dyer using sulphur dyes is that of satisfactory washing-off. Flood washing, where possible, will remove a considerable amount of the excess dye liquor but may take a considerable time. If a nip can be arranged during washing a considerable quantity of this excess will be removed but this refinement to the normal dyehouse jig is rarely available. The points made earlier regarding after-treatments and the need to neutralise residual sulphide before addition of bichromate or copper sulphate are very important to achieve repetition of results when jig dyeing sulphur colours.

Package Dyeing of Yarn

When dyeing packages of any type with sulphur dyes the colour should be properly dissolved with clean, good quality sodium sulphide. It is good practice to dissolve the sulphide previously and to decant the required quantity in order to minimise the risk of insoluble matter entering the dyebath. Anything of this nature or dyestuff which has not been taken into solution will filter on the outside or inside of the package and ruin the batch or a large part of it. The efficiency of the dyeing machine plays a large part in obtaining successful results in all types of dyeing. The rate of flow is all important, rather than pump pressure, and this is also influenced by the type of package and the way it has been built up.

Bearing in mind what has been said earlier about entering the material dry, this procedure gives satisfactory results with all but difficult mixtures and pale shades. Temperature control remains the best safeguard in these instances and, because a cotton package does not wet out easily at lower temperatures, it is best to wet out first and then enter the material into the cool dyebath. Throughout the dyeing the direction of flow should be changed frequently where possible and salt additions made gradually. High temperature technique can be used with Sulphol dyes, as the shades are practically unaffected by temperatures up to 120°C. Normally all additions to the dyebath are made at the beginning and the dyeing time can be reduced appreciably compared to normal temperature working. The efficiency of machines designed for high temperature operation is the main factor influencing the successful results which are obtained.

Yarn in Open Vessels

The open beck method is successfully used for applying Sulphol dyes and perhaps the two most important points to note are that the yarn is moved frequently and evenly and that the hanks should not be allowed to lie about in the dyehouse before washing-off. These points can be the cause of uneven patches on the material. When using Sulphol dyes in Hussong machines, the dyer should choose types which show little tendency to bronzing. The high degree of aeration caused by the propeller in these machines aggravates this tendency and whilst an even bronzing is often obtained, the rubbing fastness of the dyed material may be inferior to yarn similarly dyed in different apparatus.

Warp dyeing has been one of the principal outlets for sulphur dyestuffs in the past and they are applied very successfully by this method, although comparatively few dyehouses now continue with it. One point to watch when using sulphur dyes is the exhaustion rates. The choice of dyes which have, whenever possible, similar exhaustion rates, will make the regulation of additions less complicated and will prevent ending and uneven results. The baths should be kept clean and as free from scum and other impurities as possible, and no salt additions should be made.

Finally mention should be made of the Standfast molten metal machine and the pad/steam continuous method of application. Sulphol dyes have been applied successfully on the Standfast system but because of contamination of the Woods metal a different metal combination was found to be necessary, and one having a much higher melting point has been found suitable. This, besides raising technical difficulties in temperature control, adds to expense because few concerns can keep two types of metal readily available.

The pad/steam method, however, does not present troubles such as this. The Sulphol dyes can be applied satisfactorily from a leuco dyebath either alone or alongside their water-soluble Sulphosol equivalents. Usually a steaming time of 30 secs. to 2 mins. is satisfactory, which is followed by rinsing and aftertreating with potassium bichromate and acetic acid. Occasionally an airing device may be used between steamer and rinsing boxes.

Sulphosol Dyes

This new range of products offers the dyer advantages not possessed by the conventional type of sulphur dye. They are soluble and non-substantive in water, properties which enable them to be padded on to the material before being reduced to the substantive form. The package is thus impregnated with dyestuff before dyeing can possibly take place and the troubles caused by high rates of strike associated with many conventional sulphur dyes are greatly minimised. There is also less tendency for bronzing to occur especially with the blues.

Dyeworks having effluent troubles will also find the Suiphosol dyes of interest if they are required to do sulphur dyeing. The dyer has the choice of using as reducing agent the conventional sodium sulphide in considerably reduced quantities compared to the conventional dyestuff, or a mixture of sodium carbonate and sodium hydrosulphite. Consequently the spent dye liquor will contain only a small quantity of sulphide or hydrosulphite and will require less treatment before it is run down the drain. By applying the Sulphosol colours to viscose rayon using the soda-hydros method of reduction, the material will be found to retain its soft handle, a property which is easily destroyed should sodium sulphide be left in after dyeing with the normal dyeing procedure.

Sulphide Method of Application

The dyestuff should be pasted with a little warm water to which has been added a small quantity of wetting agent, and dissolved by boiling for a few minutes in sufficient water to ensure complete solution. The dissolved dyestuff should then be added to the dyebath, made up to the normal dyeing volume at the recommended temperature and the material entered. After working in the water solution for a short time the requisite quantity of sodium sulphide should be added, for preference having been previously dissolved, and dyeing then allowed to continue for 15–30 mins. Salt should then be added gradually, in the proportion of 15–30 grams/litre, according to the depth of shade required and dyeing allowed to continue a further 15–30 mins. or until the desired shade has been obtained. The goods should then be rinsed, aftertreated if desired, and finished in the normal manner.

It is possible to use the aqueous solution of the dyestuff along with a small quantity of wetting agent (2 c.c.s./litre) to wet out the material unless it is of poor quality and this too will give better penetrated dyeings. In cases when penetration is no problem the sulphide may be added to the dyebath before the material is entered. The goods are then worked for 15–30 mins., the salt is added and dyeing proceeds as previously.

Soda/Hydros Method

The dyestuff should be dissolved in the manner mentioned previously and reduced by adding the required quantity of a mixture of sodium carbonate and sodium hydrosulphite in the proportion of 2 : 1 respectively, preferably in solution. As in the previous method the material may be worked in the aqueous dyebath to which the reducing agent is added after 10–15 mins. or entered after reduction. Dyeing in the leuco dyebath should proceed 15–30 mins. before salt additions are made and then for a further 15–30 mins. or until the desired shade has been reached. During dyeing it may be found necessary, depending on the degree of oxidation in the dyeing apparatus, to make small additions of sodium hydrosulphite to keep the bath in its reduced condition. This is necessary particularly before and during salting but afterwards the need for these additions will become less frequent and they may be omitted towards the end of the dyeing.

Pad/Jig

When jig dyeing the property of non-substantivity in water solution is very useful. It is usual to run for 2–4 ends in the unreduced liquor after starting with dry prepared material if possible. The reducing agent is then added followed by the salt after a few more ends. For the pad/jig method the material is first padded with an aqueous solution of the dyestuff and then transferred to the jig. The jig contains the requisite quantity of sodium sulphide, calculated upon the amount of dyestuff taken up by the cloth, this being dissolved in the normal amount of liquor to which is added 15–30 grams/litre of salt. Dyeing now takes place in the normal

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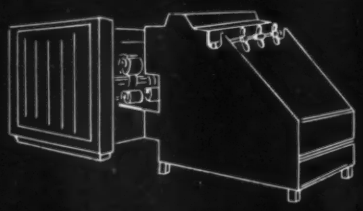

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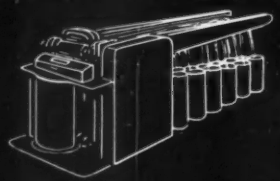

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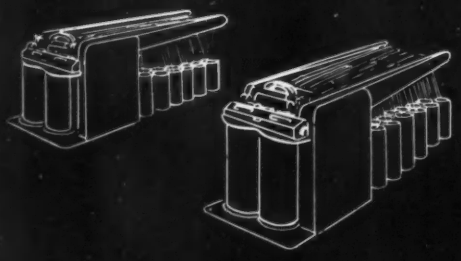

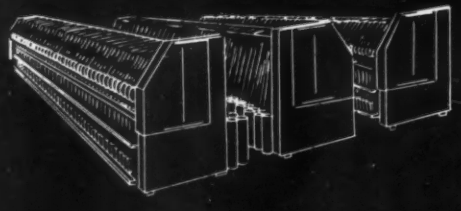

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manner and the material is rinsed, after-treated if desired and then finished in the normal manner. For very heavy shades it may be found necessary to make an addition of extra dyestuff to the jig. In this event the sulphide in the jig should be increased to cover this extra amount of dyestuff and dyeing then takes place as before. Exceptionally good penetration is achieved by this method and because of the non-substantivity of the water solution no ending is experienced.

Pad/Steam

Some Sulphosol dyes can be applied successfully on the pad steam system from a leuco padding bath. Their high solubility and comparative low sulphide requirements are helpful in preparation of the stock solutions, but it should be said that not all Sulphosol dyes are entirely suitable for this method. Results obtained with Sulphosol Dark Blue SL are better than with the corresponding Sulphol dyestuff, but the opposite is noticed with Sulphosol greens and it is possible to obtain deeper blacks with conventional sulphur black than with the solubilised type.

Because of their high solubility, the Sulphosol dyes are particularly suitable for package dyeing. By circulating the unreduced dye liquor through the yarn, danger of a rapid strike on the inside or outside of the package is virtually eliminated and mixtures of dyes having greatly varying dyeing speeds do not present the same problems. Oxidation problems and washing off are considerably simplified as the concentration of sulphide for a given shade is far less than with a conventional sulphur dye. When using the Soda/Hydros method, the bath may be allowed to oxidise towards the end of dyeing, without fear of precipitation of dyestuff. This is because with this method, the dyestuff remaining in the dyebath reverts on oxidation to the non-substantive yet still water soluble form and is not filtered out by the package as would be the case if a normal sulphur dye liquor was oxidised. This however does not apply to the Sulphosol dyestuff reduced with sodium sulphide although any tendency to precipitate is not as marked as with the conventional sulphur dye.

Rayon cakes can be dyed satisfactorily with Sulphosol dyes using the soda/hydros method if a sequestering agent is used in the dyebath. Without this there is a tendency for bronziness, due to metallic contamination (mainly iron), to appear on the shoulders of the cake. The method is the normal one and the quantity of sequestering agent varies from 0·5 to 2 grams per litre depending on the depth of shade being dyed. It should be said that the efficiency of the dyeing machine will play a large part in this method, as indeed with package dyeing in any form with any type of dyestuff, for satisfactory results cannot be expected from unsatisfactory apparatus.

Speciality Uses for Sulphosol Dyes

When applied from a soda/hydros bath at 60°C. these dyes give a reserve on acetate rayon and mixtures of viscose or cotton with acetate can be dyed to leave the acetate to be cross-dyed with disperse dyes. Some members of the range show slight staining but Sulphosol Black SG or SB give results which are exceptionally good and compare very well with the direct dyes available for the purpose besides giving far better wet fastness. "Tervlene" also is reserved and unions of "Terylene" with cellulose fibres can be dyed first by applying disperse dyes to the "Terylene" by high temperature technique and then applying Sulphosols from a soda/hydros bath to the cellulose fibre. The second process has the effect of a "reduction clear" on the "Terylene" which although not always necessary with high temperature technique has no adverse effect.

By reducing the amount of soda in the reducing mixture by half, a dyebath is obtained which is only slightly alkaline (pH 7·5–8·5) and if the temperature is kept below 60°C. mixtures of viscose or cotton or both with wool may be dyed. Most of the Sulphosol dyes will give solid shades on half wool mixtures, but some show selectivity and have greater affinity for the wool. This method is particularly useful on waste materials, mainly met with in loose form and required for black. The normal practices with this type of material are either to carbonise and then dye the wool with chrome black or to dye the entire mixture with union dyestuffs. The first method is wasteful when a large percentage of cellulosic fibre is present and the second has poor wet fastness. On the other hand a union dyed with Sulphosol Black will cover the cost of carbonising and the loss in weight and will give a high standard of wet fastness. Finally, it should be noted that nylon can be dyed with Sulphosol dyes by the soda/hydros method. The procedure is similar to that for cotton or viscose, and unions of these cellulosic fibres with nylon can be covered satisfactorily.

Dyeing for the Carpet and Hosiery Trades

DEVELOPMENTS in the carpet trade in recent times had meant that many dyers had had to experiment with new ideas and techniques and, to some extent at least, the dyestuff manufacturers had been able to give assistance in the early stages, stated Mr. W. Beal (Geigy Co. Ltd.) in a recent address to the Midlands Section of the Society of Dyers and Colourists and the Kidderminster and District Section of the Textile Institute. A similar state of affairs existed, he said, in the hosiery industry where in recent years, emphasis had been placed on the increasingly high standard of wet fastness properties which had been demanded. This had necessitated a change from the level dyeing acid dyes to the Polar, Irgalan or chrome type and this in turn had demanded new dyeing methods.

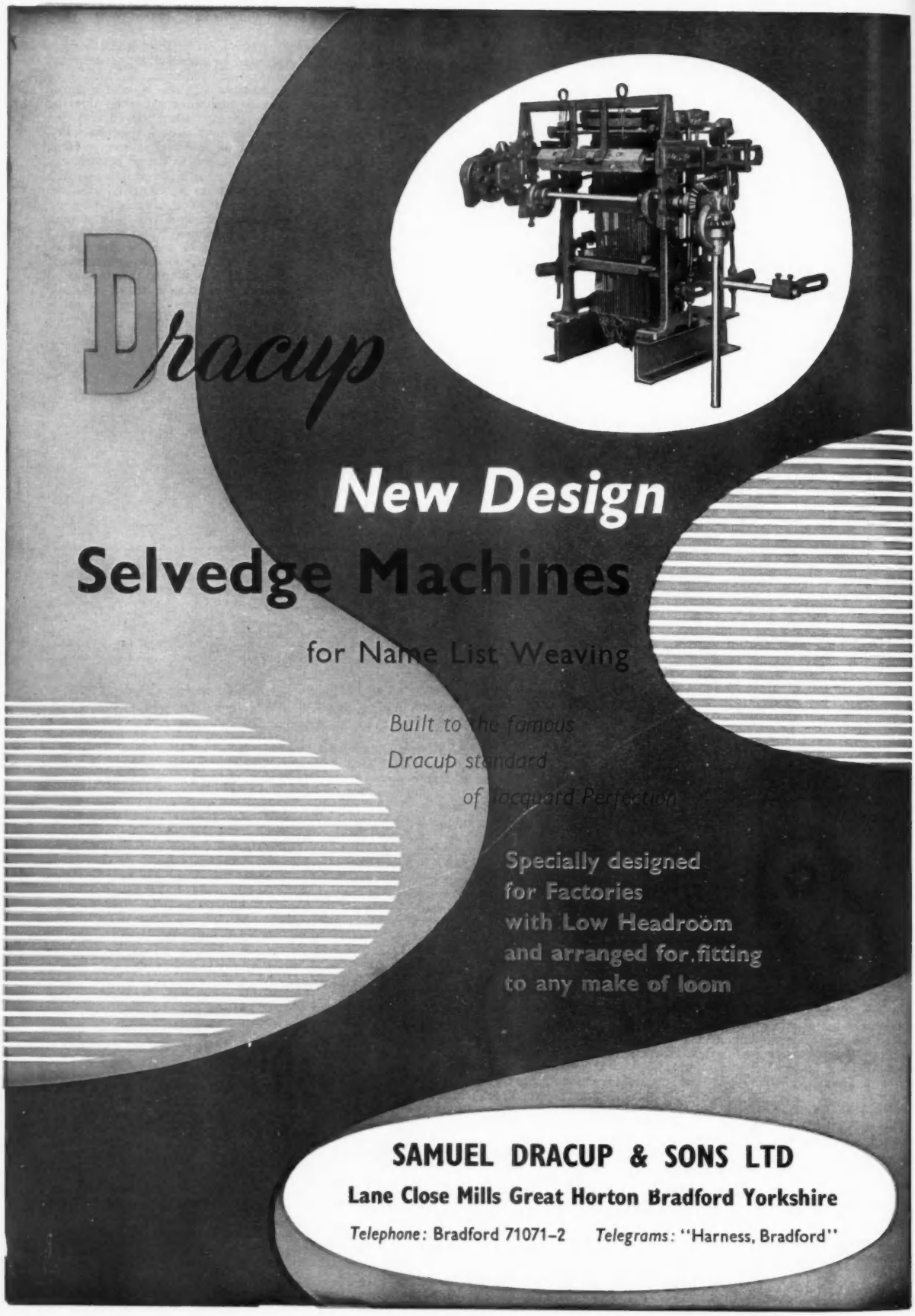
Even in the all-wool pile carpet several important changes were occurring. New fastness demands by the customer had meant new types of dye being introduced for carpet yarn dyeing. Particularly for the export trade, pale shades had been very popular and this had illustrated clearly the deficiency of the three-colour level dyeing acid combination for light fastness. Neutral-dyeing prematallised dyes of the Irgalan type were being introduced in ever increasing quantities for carpet yarn dyeing. It was also apparent that these dyes gave a better coverage of the various blends used in the carpet yarns and thus result in an improved appearance.

Discussing mixtures, Mr. Beal said that for wool/"Fibro" yarns it was advisable to choose those direct cotton dyes which gave a minimum staining of wool so that a more accurate control could be placed on the dyeing operation. But they had also to consider fastness properties and price, and were left with only a very small range of direct cotton dyes. It was therefore not surprising that many firms had chosen to purchase ready-made union dyes rather than to try and separate wool and cotton dyes to produce solid shades on wool/"Fibro" yarns. Under the new conditions, accurate pH control was required—something new to the majority of carpet yarn dyers. Correction of the water hardness to avoid dusting of the yarn was also a point of importance. Similar problems also existed in the dyeing of "Fibro"/"Fibrolane" mixtures which, although only in the trade to a small extent at the moment, nevertheless appeared to be on the increase.

For several years another method of dyeing wool/cellulosic unions for the velvet and pile fabric industry—the Hertli technique—had been used and its possibilities were now being examined for use in carpet yarn dyeing. This enabled wool/cellulosic mixtures to be dyed by the one-bath method under acid conditions. For wool and secondary acetate, many of the same general problems still applied; pH was again very important for this form of dyeing.

There was one other type of carpet yarn which was potentially important and just finding its feet in this country—100% acrylic yarn made from fibres such as "Acrilan" or "Courtelle." Apart from pest resistance and perhaps length of service, it was difficult, however, to see where they would show to advantage against an all-wool carpet, particularly in view of the fact that they were not cheap fibres. Acrylic fibres of the basic type—i.e. "Acrilan"—could be dyed to relatively full shades using dispersed acetate dyes or, alternatively, they could be dyed with normal acid, prematallised or chrome dyes. Fibres of the "Courtelle" type could be dyed only to pale-medium shades with acetate dyes and had no affinity whatsoever for wool dyes but could be dyed to a complete range of shades with basic dyes.

The most obvious trend of dyeing in the hosiery industry in recent years had been the demand for fast to washing shades. This had in turn resulted in the rejection by most firms of the level dyeing acid dyes for all except paler shades and had seen the introduction on a large scale of acid milling, Polar prematallised and chrome dyes for yarn dyeing.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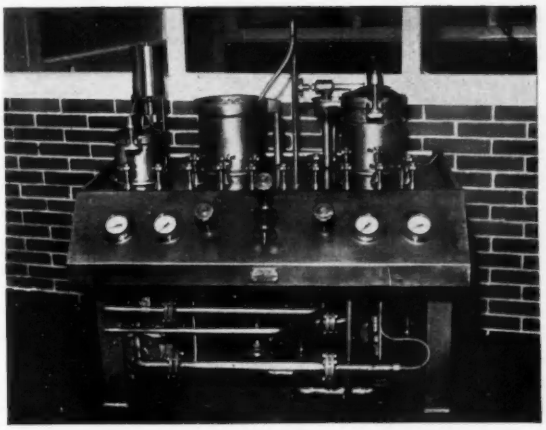
Developments in the Pressure Dyeing of Yarns



Static pressure laboratory dyeing machine

MAJOR developments in the pressure dyeing of yarns—particularly those containing "Terylene," etc.—are stated to have been made by Jagri G.m.b.H., Gescher, in the Western Zone of Germany. Pointing out that considerable numbers of these plants have now been installed in Germany and other parts of the Continent the firm say the first big unit has recently been put into commission in the U.K. In the Jagri system the pressure is raised in the dye vessel by means of a weighting system instead of by pumps but it is claimed that the design also incorporates modifications developed with the object of economising on liquor consumption, power consumption and dyeing time.

Jagri refer to their machine as a "static pressure dyeing machine" and the device for obtaining the static pressure is especially interesting, as no second pump, or air or gas cushioning is needed. A small pressure cylinder with piston delivers the necessary pressure without additional energy and without additional cost. After filling the dyeing vessel, including the pipe lines, with dyeing liquor, the static pressure may be adjusted by means of weights applied to the piston. The pressure is kept constant during the whole of the dyeing process by a special device.

The dyeing vessel is erected on a tripod base, the pump unit being connected to one leg of the tripod and the motor is fixed vertically above the pump and above ground level ensuring easy access and foolproof operation. The dyeing machines can be equipped with a hinged screw locking lid, or a bayonet rapid closing device (patented) which permits the opening and closing of the lid by means of one handle only. A special safety device prevents the opening of the lid under pressure. A liquor reversing system is used on the Jagri machines consisting mainly of a stainless steel arch pipe lying centrally in the bottom of the vessel. The change of liquor circulation from inside to outside and outside to inside is obtained by simply reversing this special device.

The indirect heating coil lying in the bottom of the vessel is arranged above the liquor reversing system. Being accessible, it is easy to clean and is claimed to produce the most heat as the dyeing liquor passes on continuously. The liquor reversing system can be operated manually or automatically, and in the latter case, an automatic direction control is connected to it. This consists of a geared motor with threaded shaft and travelling block and the speed of the motor and that of the threaded shaft can be adjusted by a special timing device according to the desired time of dyeing inside to outside and conversely. The travelling block travels along the threaded shaft backwards and forwards in a predetermined time connecting with a switch at the end of the shaft each time. These switches control the bar guiding the liquor reversing system, and whenever the travelling block contacts one of the switches, the direction of the liquor reversing system is changed immediately.

The Jagri machine is equipped with a special sampling device which enables samples to be taken directly from the dyed batch at temperatures above 100°C., without interrupting the dyeing process. This system prevents differences which might appear in a separate sampling tank because of the different flow and temperature conditions. All instruments, valves, etc., are arranged on one board for easy operation and a special panel holds all control instruments. A special liquor observation glass is fitted into the panel to control the flow of the dyeing liquor. The following parts can also be supplied for fully automatic operation:—

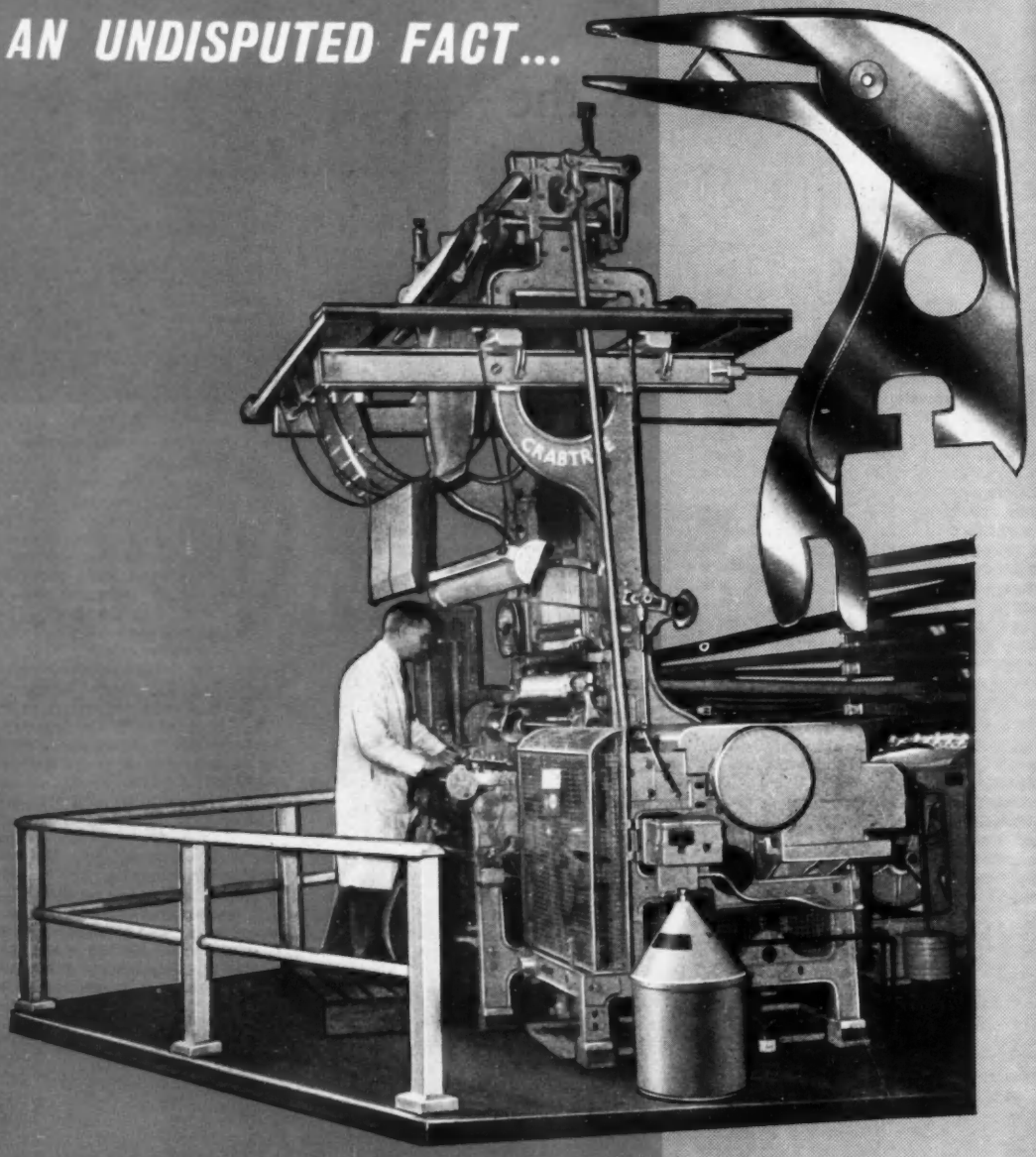
(1) Electric temperature control for heating up to a predetermined temperature and for holding this temperature.
(2) Special temperature programme control which permits the automatic increase and decrease of the temperature at predetermined times, which can be set at will.
(3) Special programme control for controlling the whole process which is automatically registered on a chart.

Static pressure laboratory dyeing machines are also supplied, operating on the same principles as the standard dyeing machines. Suitable for dyeing all kinds of material, when filled with a suitable volume of dyeing liquor the machines are said to guarantee perfect precision when dyeing according to dyeing data. All instruments are clearly arranged on one board to ensure easy operation of the machine.

A new material carrier for hanks has also been produced and this permits the dyeing of hanks in round machines, particularly in the static pressure dyeing machines. The height of this special carrier can be

An installation of Jagri equipment showing (left) a carrier of dyed yarn, just removed from the machine

IT'S AN UNDISPUTED FACT...



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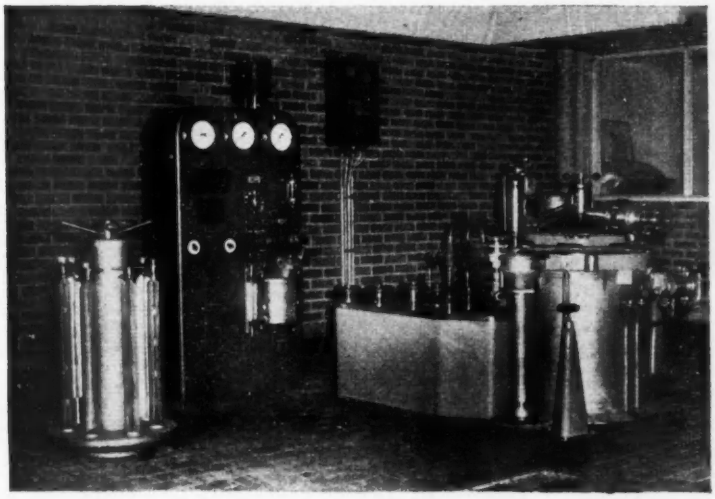
adjusted to suit different types of hanks. The dyeing liquor penetrates the central column and flows down the hanks and through the perforated bottom plate. When operating the liquor reversing system the dyeing liquor flows in the opposite direction "outside/inside," and the material carrier is suitable for dyeing all kinds of material in hank form. Additionally, small complete units can be supplied for dyeing sample lots of 20 lbs. upwards. All Jagri static pressure dyeing machines can be fitted with a special centrifugal pump as well as with a turbo pump, according to requirements. (Agents for Jagri in the U.K. and Eire are Barke Machinery, 100 Portland Street, Ashton-under-Lyne, Lancs.)



(right) The control panel of the Jagri pressure dyeing plant

Bleaching Cotton and Cotton Blends with Hydrogen Peroxide

THE cheapness of hypochlorite and its ability to produce excellent results given adequate control, remained as true today as in the 1930's and 1940's, said Mr. L. Chesner (Laporte Chemicals Ltd.) in a recent address to the Manchester Section of the Society of Dyers and Colourists. Nevertheless, hydrogen peroxide in Britain, he went on, was now being used in increasing quantities for cotton processing, and the reasons were largely associated with the following points:

(1) The increasing use of cotton blended fabrics, many of which dictates the use of a mild and versatile bleaching agent which would have no adverse effect on the secondary fibre.
(2) The fact that peroxide was able to reduce processing times. The increased chemical cost in comparison with hypochlorite was very often more than outweighed by the reduced labour costs and overheads.
(3) The use of a shorter process coupled with improved working conditions.
(4) Cleaner liquor effluents, especially from kiers.

Discussing cotton bleaching, Mr. Chesner said that it had been traditional to remove as much impurity as possible by separate desizing and scouring treatments. From a peroxide standpoint, the question arose as to whether such types of stringent treatments were necessary to attain a high standard of whiteness as opposed to cellulose purity because otherwise the severity of the process could be tailored to the end use. With the increasing tempo of foreign competition this outlook was likely to become more firmly entrenched.

One might ask, he continued, whether these relatively short treatments and use of mild bleaching agents conflicted with the properties required in the finished goods. For example, it was long supposed that absorbency—which was usually a desirable characteristic—could only be gained by a separate caustic scour, preferably under pressure before bleaching and the resultant diminution in wax content was supposed to be directly related to the improved state of absorbency, but this had been shown to be untrue. The reasons for removing impurities prior to chlorine bleaching did not apply in the case of peroxide, since there was no danger of formation of chloramines or other by-products of the bleaching process which might later impair whiteness and strength.

The sensitivity of hydrogen peroxide to metallic contamination in general had for a long time acted as a deterring factor to the more cautious bleacher but in actual fact the dangers from metallic contamination although real, could be over-emphasised. Fairly high concentrations of soluble iron, e.g. 50 p.p.m. could be tolerated with little adverse effect, whilst iron stains caused by direct contact with metal or rust could be overcome by painting surfaces with a slurry of silicate cement made from "Ferrocrete" rapid setting cement. Laboratory work had shown that an effective means of inactivating copper contamination on fabrics, had been to incorporate a cheap source of protein or waste peptide into the bleaching solution. Inactivation probably occurred by a complexing action.

A relatively simple and inexpensive bleaching method was the use of a peroxide cold pad process consisting of cloth impregnation and storage at room temperature. Its obvious advantage was the use of simple existing equipment such as pad mangles and its ability to give a more than adequate dyers' white on cloths ranging from gauzes to duck fabrics. The process consisted of padding cloth ideally to 75 - 100% pick up in a 5 - 10 vol. bath and leaving it covered overnight with plastic sheeting to prevent drying-in at the edges. The method was versatile and could be used for long or short runs, depending on storage facilities. The desizing stage could usually be omitted due to the partial solubilising of the starches by the bleaching solution.

In discussing some of the problems connected with mill effluents, Mr. Chesner said some idea of the immensity of the problem of oxygen deficiency in water due to trade effluents and sewage could be gauged from a recent survey carried out on the Thames estuary. At a distance 20 miles below London Bridge, the oxygen deficiency (per mile of river) was calculated at 200 tons. During the course of experiments carried out, it was established that the caustic effluent from a 3-ton kier load used once in 24 hours was comparable in terms of domestic sewage to "a population equivalent" of approximately 2,200 people. The use of a peroxide bleaching solution for kiering provided a means of substantially overcoming the problem of filthy kier effluents. The solution was essentially provided by avoiding the problem rather than curing it, since both cloth and effluent were bleached simultaneously in the kier in the absence of high concentrations of caustic soda. This, said Mr. Chesner, gave a vastly improved kier effluent, which was almost colourless.

How to set the pace in fastness

A significant advance in textile printing occurred with the advent of resin-bonded pigments. These new colours permitted striking patterns in brilliant shades with excellent fastness to sunlight, atmospheric fumes, washing and dry cleaning. But they still left something to be desired on crocking.

What was needed was a simple method of better protecting the pigments against severe abrasion. Today's solution is one in which CHEMIGUM LATEX plays a major role. Easily modified with other materials and mixed into the colours at the printer's, CHEMIGUM LATEX helps form a protective coating which locks in the pigment particles. The end result sets the current pace in fastness to crocking, plus even further improving resistance to washing.

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Book Reviews

THE MAN-MADE FIBRES INDUSTRY. By Dr. R. Robson. Macmillan and Co. Ltd., St. Martin's Street, London, W.C.2. 1958. Pp. 135 (price 21s.).

The author, who has recently written a very interesting study on the cotton industry (London: Macmillan and Co. Ltd.; 1957) has now produced a sequel dealing with the man-made fibres industry). It gives an account of the economic and scientific basis of this industry in England and overseas. The history is traced from its experimental period in the 1900's through to the 1930's when staple fibre and high tenacity rayon were developed, up to the subsequent discovery of the synthetic fibres.

The book begins with a well compiled table on the classification of man-made fibres, divided into fibres from natural polymers (cellulose: rayon, acetate, triacetate) and non-cellulosic protein fibres ("Ardil," "Vicara"—both now defunct), "Lanital," "Fibrolane," etc.), and alginate fibres, and fibres made from synthetic polymers (polyamide: nylon, Perlon; polyester: "Terylene," "Dacron," "Diolen"; polyethylene: "Reevon," "Courlene"; polyvinyl (acrylic): "Orlon," "Acrilan," "Courtelle," "Dynel," etc.; polyvinyl (non-acrylic): "Bexan," "Rhovyl," "Pe-Ce," "Saran," "Vinyon," etc., and mineral fibres: glass. The first chapter deals with the basic material and processes for the production of cellulosic and non-cellulosic filament and staple fibres. To the list of references (p. 14) "Fibres from Synthetic Polymers," edited by Rowland Hill (Elsevier Publishing-Cleaver Hume Press, London; 1953) should be added.

In the following chapters the author outlines the development of man-made fibres from the early stages of the Chardonnet nitrocellulose process in 1885, the viscose process, first announced by Cross and Bevan in 1892, the development of rayon staple in 1930, up to the discovery of nylon, "Terylene," "Orlon" and "Courtelle." The first stage in the development of the rayon industry had as its object the replacement of silk, and although the annual world production of cotton, wool, cellulosic filament and staple, and non-cellulosics has very much increased, the decline of silk is very noticeable. It is still available but has been replaced by rayon and other fibres. There are statistical graphs and diagrams on world production of fibres; distribution of viscose and acetate yarn production by trades (U.S.A.), world production of cellulose filament and staple, on the consumption of fibres in the British knitting industry (1956), and on the estimated production and planned capacity of non-cellulosic man-made fibres in Britain, U.S.A., Western Germany, Japan, France, Italy, and other countries.

In the next chapter the structure of the rayon and synthetic fibre industries in the principal countries is explained and the history of some of the dominant textile and chemical firms, engaged in the production of man-made fibres, is recorded. Prices and costs of production and fibre properties and inter-fibre competition is the subject of the last two chapters; an appendix deals with the chemistry of man-made fibres, fibre and yarn structure, polymerisation, wood pulp and cellulose, and the various sources of basic chemicals used in the man-made fibre industry. There is a combined subject and author index at the end. As mentioned, the book deals essentially with the economic side of the industry, but one would have liked to hear more of the author's views, even prophetic ones, of the future trends in rayon and man-made fibres, and their possible further impact on the older and traditional fibres. In a future edition the rather large number of footnotes should be avoided and worked into the text. However, Dr. Robson's new publication is a good, but smaller, companion to his book on the cotton industry.

B.S.

* * *

PRESSURE MEASUREMENT IN VACUUM SYSTEMS. By J. H. Leck. Published on behalf of the Institute of Physics by Chapman and Hall Ltd., 37 Essex Street, London, W.C.2 (price 30s.).

It is no disparagement of this work to remark that its value to students would be much greater were an introduction to the subject already available, especially in view of the increased use of high-vacuum techniques in an ever-expanding range of industries. The book under review is the first to treat in detail the subject of pressure measurement and is thus a notable contribution to specialist literature. The first five chapters describe the various methods of pressure measurement in normal use, viz. mechanical manometers, thermal conductivity gauges, ionization gauges, the Knudsen radiometer gauge and surface reaction techniques, placing equal emphasis on theoretical background and the practical aspects of gauge design. The final chapter is concerned with gauge calibration. Nearly two hundred references to the literature are provided, but there is no mention of the publications of the Committee on Vacuum Techniques, an American body which provides common ground for the exchange of information on high-vacuum techniques for research and industrial processing.

* * *

THE EUROPEAN COMMON MARKET AND FREE TRADE AREA. The Institute of Bankers, 10 Lombard Street, London, E.C.3 (price 5s.).

Five experts recently delivered a series of lectures sponsored by the Extra-Mural Department of London University and the Institute of Bankers. The response was so great that they are now made available to a wider public. The first lecturer, M. F. Spaak, draws attention to the lessons to be learned from the experiences of the European Coal and Steel Community, the initial step towards European economic integration. The second step, the Common Market Treaty, is the subject of D. J. Ezra's lecture, which is followed by a "candid friend's" appraisal, entitled "Little or Big Europe?" by P. Bareau. Ronald Brech, head of the Economics and Statistics Dept., Unilever Ltd., deals with the challenge of the Free Trade Area to management, to Britain and to Europe, a theme continued by F. W. Holmes, of Wellington University, who assesses the implications of the Free Trade Area for the Commonwealth countries.

S.P.S.

* * *

IDENTIFICATION OF TEXTILE MATERIALS. Fourth edition. 1958. Textile Institute, 10 Blackfriars Street, Manchester 3 (price 27s.6d.).

In preparing previous editions of this outstanding guide, Technical Committee "C," a sub-committee of the Institute's Unification of Testing Methods Committee, had perforce to bear in mind war-engendered shortages of equipment, such as microscopes, which rendered more difficult the work of technologists and students. Freed from such sympathetic considerations, the Committee has now produced a much-enlarged re-written work containing many more photomicrographs, some of them in colour.

The Committee's aim has been to describe the best tests known which can be carried out in a laboratory provided with a microscope and other usual equipment. Commercial use has been the criterion for inclusion of each fibre considered. Descriptions of the properties of natural and man-made fibres precede the scheme of analysis in which the various analytical procedures are arranged in a sequence most likely to lead to expeditious identification. This section ends with a table of dimensions of some animal and vegetable fibres. Notes on reagents and methods of test to follow. It is quite safe to forecast good sales for this most useful and time-saving publication.

S.P.S.

* * *

VERANDERUNGEN AN FASERN BEI DER BLEICHE MIT NATRIUMCHLORIT UND UBER EINIGE VERGILBUNGSERSCHEINUNGEN. (Changes in Fibres During Bleaching with Sodium Chlorite, and some Features of Yellowing.) By Prof. W. Weltzien and Dr. K. Windeck. Westdeutscher Verlag, Opladen und Köln. 1957. Pp. 51 (price DM 14·85).

A series of experiments are described studying the changes which occur when rayon and Perlon are bleached with sodium chlorite. Bleaching was carried out repeatedly since the changes are only small. It was found that there was a slight change in properties after the first bleach, but little further change after four more bleaches. Variations in change were observed according to the conditions of bleaching, e.g. at pH 3·8 to 4·8, and with distilled and softened water. The extension of break of Perlon is a function of the pH of the solution.

Many tables are quoted about tensile strength, extension dry and wet, degree of polymerisation and swelling, measurements of pH of the solution before and after bleaching, etc. The fibres examined include viscose, cuprammonium, rayon staple, Perlon L as yarn and fabric. Yellowing was studied at various temperatures and various degrees of humidity, and a definite relationship with these factors was established. The fibres were either scoured neutral or prepared with acid and alkali. The results indicate that the experimental methods are reliable and reproducible. Full details of these methods are given.

B.S.

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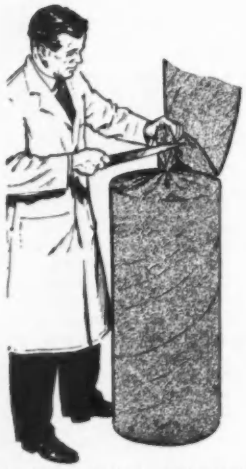

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Export Opportunities

Pakistan:
Defence, Railway and Post etc. Stores

United Traders, Haroon Chambers, South Napier Road, Karachi-2, are keen to represent U.K. firms who have previously dealt through the Pakistan High Commission in London, without using local agents. The Karachi concern's interest would be in defence stores, railway stores, post and telegraph stores, and general engineering products. Mr. W. F. J. Davis, a partner of United Traders, is prepared to visit the U.K. to meet interested manufacturers. Established in 1949, they are importers, exporters and manufacturers' agents holding a number of U.K. agencies. Manufacturers interested should write direct to the Pakistani concern, also notify the U.K. Trade Commissioner, 1st Floor, Finlay House, McLeod Road, Karachi.

Mexico:
Coconut Fibre, etc.

The British Embassy at Mexico City has drawn attention to a notice which appeared in a recent edition of "Investors' Mexican Letter" about opportunities for U.K. firms for investment in Mexico in the waste utilization field. The Mexican government and quasi-official financial institutions (e.g. Nacional Financiera) would be willing to co-operate with companies formed to utilize coconut fibre for the production of marine cordage and pineapple leaf fibre as a substitute for jute or coarser grades of flax. U.K. firms interested in this enquiry should write direct to the Counsellor (Commercial), British Embassy, Mexico City.

Pakistan Ministry of Supply

The U.K. Trade Commissioner at Karachi has reported that a Pakistan Ministry of Supply has been formed. The Department of Supply and Development has been divided and the supply wing is now part of the new Ministry. It is the intention that the new Pakistan Ministry of Supply will take over those purchasing functions at present carried out by Pakistan embassies and high commissions abroad. Exporters interested in quoting against Pakistan government tenders and not already represented in Pakistan would be well advised to appoint agents. Export Services Branch and the U.K. Trade Commissioner at Karachi will be ready to assist interested firms in obtaining suitable agents.

Western Germany:
Worsteds, Tweeds, etc.

The firm of Heinz Uerlings, München-Gladbach, Nicodemstr. 13, would like to undertake agency business on behalf of a U.K. firm for flannel cloth for trousers, worsteds (medium to better quality) and Harris tweeds. Established in 1946, they are agents dealing in textiles and representing manufacturers of cotton materials (cord, velveteen, velour), and sewing thread. Manufacturers interested should write direct, also notify the British Consulate-General, Duesseldorf, Cecilien Allee 16.

Canada:
Textile and Light Industrial Products

Canadian Spool Cotton Co., 421 Pie IX Blvd., Montreal 4, would like to hear from U.K. firms interested in association with them in finishing or part manufacture of products for complete manufacture under licence. The company would like to get in touch with manufacturers of light industrial products and not only textile and analagous trades. Circumstances have recently enabled them to release about 80,000 sq. ft. of factory space in a modern 3-storey addition to the mill together with surplus steam and power facilities. The factory space is well equipped with modern lighting, an up-to-date air conditioning system, polished hardwood floors with washroom and servicing block at each floor level. Canadian Spool Cotton Co. are a wholly owned subsidiary of J. & P. Coats Co. Ltd., Glasgow, and have been operating in Canada for over 50 years. Manufacturers interested should write direct to Mr. H. T. Clifton, director, Canadian Spool Cotton Co., also notify the U.K. Trade Commissioner, 1111 Beaver Hall Hill, Montreal.

Trinidad:
Woollen and Worsted Suitings

Mr. H. L. Yuen, assistant sales manager of Gordon, Grant and Co. Ltd., P.O. Box 286, Port of Spain, expects to be in London for a week or ten days in the first half of June. He will be visiting some of his company's principals, but also wishes to secure the agency of a first-class manufacturer of woollen and worsted tropical and tweed suitings. Established in 1872, Gordon Grant & Co. Ltd. are one of the leading merchant houses in Trinidad. They operate as private bankers, importers and exporters, commission, insurance and shipping agents. Manufacturers interested should write to Mr. H. Lee Yuen, c/o Export Services Branch, Room 732, Lacon House, Theobalds Road, London, W.C.1.

Canada:
Nylon Twine

S. Paskal and Co., 417 St. Peter Street, Montreal, are interested in receiving offers from U.K. manufacturers of nylon twine. The company operate mainly on an import basis, and are known to import a wide range of twines and ropes from various sources. Manufacturers interested should write direct, also notify the U.K. Trade Commissioner, 1111 Beaver Hall Hill, Montreal.

Ethiopia:
Floor Cloths

Mr. K. Tcheupdjian, P.O. Box 161, Addis Ababa, would like offers from U.K. manufacturers of coarse cotton floor cloths, size 65 × 60 cms. or slightly smaller. He is at present importing these cloths at the rate of about £500 annually from Czechoslovakia. Manufacturers interested in this enquiry should write direct, also notify the British Embassy, Commercial Department, P.O. Box 858, Addis Ababa.

Western Germany:
Tenting Cloths, etc.

Herr Hans Engert, Mannheim, Duererstrasse 97, is interested in obtaining U.K. agencies for tenting cloths and flannel and mohair piece goods for women's clothing. He is an agent and covers Baden-Wuerttemberg where he claims to be well introduced to industry, wholesalers and mail-order houses. Manufacturers interested should write direct, notify the British Consulate-General, Sophienstrasse 24B, Stuttgart.

U.S.A.:
Component Parts Used in the Manufacture of Luggage

The Reliable Luggage, Inc., West Pittsburg, Lawrence County, Pennsylvania, want to import components used in the manufacture of luggage, direct from U.K. manufacturers. These include vinyl coated fabrics, rayon and acetate linings, and related items. Established in 1919, they are manufacturers of medium priced men's and women's luggage and they distribute to department stores and various manufacturers. They cover the whole of the U.S.A. and manufacturers interested should write direct to Mr. L. R. Weiner, at the address above. Quotations should show f.o.b. and c.i.f. prices, New York or Cleveland in dollars, and firms should copy their correspondence to the British Consulate General, 1828 Illuminating Building, 55 Public Square, Cleveland 13, Ohio.

British East Africa:
Piece Goods

Macpherson, Train and Co. (E.A.) Ltd., P.O. Box 1266, Nairobi, are anxious to get in touch with unrepresented U.K. manufacturers of cotton and spun rayon prints, cotton gingham corded and plain satin, taffeta, woollen blazer cloth, cotton voile and embossed fancy cotton piece goods. A private limited company incorporated in 1949, they handle a wide range of goods. The head office is at Nairobi and branches are maintained at Mombasa, Kampala and Dar es salaam. Manufacturers interested should write direct also notify the U.K. Trade Commissioner, P.O. Box 30133, Memorial Hall, Nairobi, Kenya.

Western Germany:
Cheviot Piece Goods

Mr. E. Thieme, Muenchen 42, Fuerstenreder Strasse 20, would like to represent U.K. manufacturers of high and medium quality cheviot material. Said to have good contacts in the trade, he at present represents German manufacturers of poplin and woollen goods as well as a U.K. manufacturer of tweed. Manufacturers interested should write direct, also notify the British Consulate-General, Akadamiestrasse 7-9, Munich 13.

correct light for colour matching—£25

For matching dyes, fabrics, pigments or products of any kind where colour enters into the specification, you need a special type of light. But it needn't cost you a lot of money. The Siemens Ediswan Industrial Colour Matching Unit gives you an unvarying source of artificial daylight of high luminous intensity for only £25. The spectral quality of the light from this unit is almost identical with that of natural daylight at a colour temperature of 6500—7000°K. The shaped reflector and 24 x 17½ in. diffusing screen spread the light evenly over the working area and there is a remote control that switches off the fluorescent tubes for matching colours by incandescent light only. The unit is supplied ready to operate directly from the 200/250 volt 50 cycle supply. Total consumption is 220 watts. We will gladly send you a folder describing in detail the unit and its method of use.

INDUSTRIAL COLOUR MATCHING UNIT TYPE FTF 2444

SIEMENS EDISWAN

SIEMENS EDISON SWAN LIMITED
LAMP & LIGHTING DIVISION,
38/39 UPPER THAMES STREET, E.C.4.
DISTRICT OFFICES AND BRANCHES
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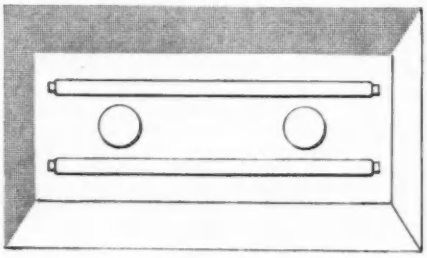

Complete with control gear, lamps (2 filament and 2 blue fluorescent), remote control box and 2 yd. 7 core cable.

PRICE: £25

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CRC PD 11

Textile Trade and Prospects

Cotton Yarns and Cloths

Lowering of the bank rate coupled with a slight improvement in the credit squeeze exercised little effect on general trading conditions. On the contrary, the grave international situation has more than damped any enthusiasm which could be aroused over current market prospects. It has been a period also where holidays—aggravated by the overlapping in the different districts—exert a distinctly adverse effect on business negotiations. Practically nothing has occurred to stimulate buying activity in either yarns or cloths and the resultant volume of trade is probably lower than for many months. Inquiry for yarns has been on a very limited scale but, in its present unsatisfactory manner, the counts and qualities covered have been extremely varied. The off-take in good quality mule doubling wefts leaves much to be desired and considerably more business would be welcomed in nearly all hosiery qualities. Most of the business put through has been in medium count mule and ring yarns on cop, cheese, cone and beam. Some counts can be had for immediate delivery from mill stocks. Coarse counts and condensor types continue to be absorbed but the closure of many weaving sheds is unpleasantly obvious from the reduced weights turned over. Speciality yarns and a fairly wide range of blended types, also many fancy folded effects are in reasonable request and continue to maintain interest. Some few instances have been recorded of spasmodic orders of small quantities from one or two Continental customers.

Stocks of cloth tend to accumulate in manufacturers' warehouses and present low turnover does not improve the position. It is a sad reflection on present civilisation when international upsets can depress things to such low levels and an outbreak of war could almost overnight throw industry into top gear. Short time working and extended holidays continue in most areas and many managements must wonder how long this will continue or will it go worse to sink to the awful times of the 1930's.

A small volume of business has continued, a large proportion of it in apparel cloths. Dress goods in the cheaper ranges amongst printed and woven designs have been in modest request and the cheaper printed shirtings in attractive fast colours have found some support. The more expensive lines in dobby and jacquard cloths are moving very slowly and interest is also sadly lacking in some screen printed types. The position in furnishing fabrics is no better with buyers operating only for immediate requirements in a very cautious manner. Novel effects in contemporary designs attract interest but firm bookings of substantial volume are practically absent. Household textiles are perhaps a little better with replacements taking place over a wider range in towellings, sheetings and table cloths, etc. Even so, the position here is nothing like it could be in more normal times. Export orders are few and far between but a trickle of goods keeps moving to one or two Commonwealth and Continental outlets.

Drought Cuts Australian Wool Clips
Wool Production and Consumption

A decline of 42 million lbs. in Australia's wool clip for the 1958/59 season is forecast by the National Council of Wool-selling Brokers. The preliminary forecast for receipts into brokers' stores indicates that 4,240,500 bales should be received in 1958/59, states the president. It is estimated provisionally that total wool production will be 1,386 million lb. This compares with the Commonwealth Statistician's preliminary estimate of 1,428 million lbs. for the 1957/58 season. Drought is the main cause of the drop in output. Australia's wool exports for the 11 months of the season up to May 31 totalled 1,097·9 million lbs., compared with 1,199·7 million lbs. in the corresponding months of the previous season.

The U.K. was the chief customer with shipments of 256·5 million lbs., followed by Japan (188·3 million lbs.), France (174·4 million lbs.) and Belgium (95·5 million lbs.). Wool top exports totalled 15·6 million lbs., as against 13·6 million lbs. in the comparative period of the 1956/57 season.

There was a continued deterioration in the rate of wool consumption, top production and yarn delivery in the U.K. during May, states the Wool Industry Bureau of Statistics. The rate of wool consumption was almost 5% lower than in April and more than 16% below May, 1957. Consumption for topmaking purposes was 18% lower than in May last year and woollen trade consumption 12% lower. Top production was 19% below the post-war record set up in May, 1957, and approximately corresponding declines were shown in the rate of delivery of worsted yarns and woven wool cloth. May output figures were: Wool consumption, 35·39 million lbs. (clean weight); top production, 23·31 million lbs.; tops drawn, 15·46 million lbs.; worsted yarns delivered, 15·79 million lbs.; woven wool fabrics delivered, 25·90 million sq. yds.; blankets delivered, 1·66 million sq. yds.

There was strong demand for New Zealand wools of woollen trade types at the first London wool sale of the July series. Prices were in some cases 10 to 15% higher than at the May sales. Bidding was well maintained for all descriptions in the offering of 15,000 bales, with the home trade substantially the larger buyer and useful support from the Continent. Australian wools, totalling 4,459 bales, were largely merino. Topmaking styles of 64s quality moved in buyers' favour but those of 60s and 60-64s quality moved against the buyer. From New Zealand came 9,282 bales, of which 2,300 were in the grease. The small offering of greasy lambs met a keen demand, with prices fully 7½% higher, and values for scoured wools were generally 10% up. A small quantity of scoured merinos sold better than during the May sales, values advancing between 5 and 10%. Among the slipes, lambs were mostly 5 to 7½% dearer and sheep generally 10 to 15% up.

Linen Trade Review

When the future of the linen industry was under discussion in the N. Ireland Senate during the reading of the Appropriation Bill, it was stated that, while the export of linen damask was about 42 million yds. prior to world war I, it had declined to only 2¼ million sq. yds. in 1957. During the last 18 months three spinning mills and six weaving factories have closed down in N. Ireland. The casualties among firms in the industry in N. Ireland and Scotland are the inevitable consequence of the move towards national self sufficiency in many former overseas markets. This was stimulated by shortage of exports during the war years, and is in any event a stage in industrial development of countries hitherto mainly concerned in agriculture and in the production of raw materials. The rapid expansion of man-made fibre textile production has inevitably resulted in inroads into established markets at home and abroad for natural fibre products, in which the newer goods are favoured by greater stability in raw material price and, generally, lower manufacturing cost.

To what further extent manufacturing capacity in the linen industry must contract before economic stability is established will depend on the efforts being made to retain existing markets and to find new outlets for its products. Analysis of the casualties incurred, and of the problems still facing survivors, indicates clearly that the solution does not lie entirely with re-equipment, work study, or in quality control, although all these can make an important contribution. Vision and craftsmanship, combined with the ability to produce and market the end products at competitive prices, are without exception the means by which those firms in the industry—and there are a few—are still working to capacity with a profitable turnover.

It is reported that the Central Council of the N. Ireland linen industry is working out plans to ensure a more stable future for it. The Post-War Planning Committee, and other bodies formerly entrusted with a similar task accomplished little because of their inability to foresee the trend of world political and economic develop-

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Exclusive Goodyear development means stronger, thinner, more flexible transmission belting.

No splice failure
In construction the cord is wound continuously around two pulleys to produce a truly endless belt.

No ply separation
The single layer of load carrying cords round the pulley together, preventing internal stress.

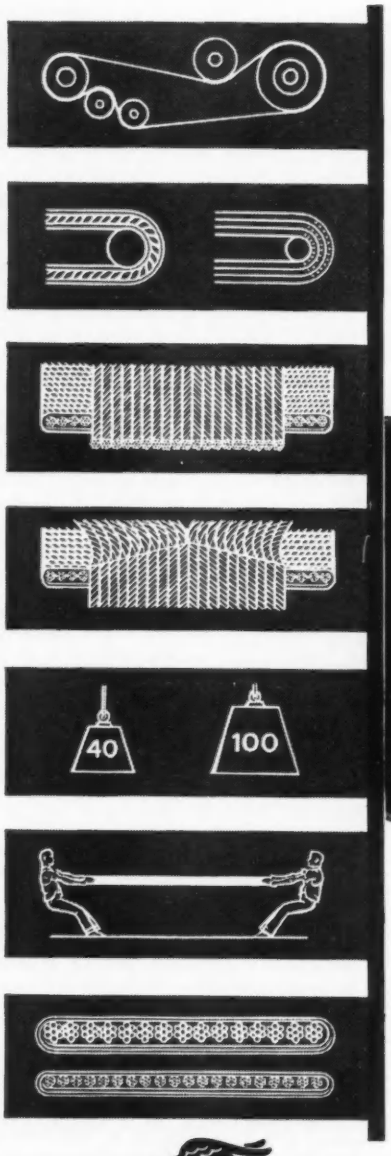
Less lateral movement
To neutralize lateral movement half the cords are twisted to the right and half to the left.

Elastic envelope
Designed to provide high friction surface to grip the pulley and transfer load to the cords.

Stronger 3T Cord
2½ times stronger than cotton and each filament of fibre is continuous, like the cord itself.

Less stretch
Triple Tempering removes surplus stretch but only to a degree where it does not hinder the flexibility of the fibre.

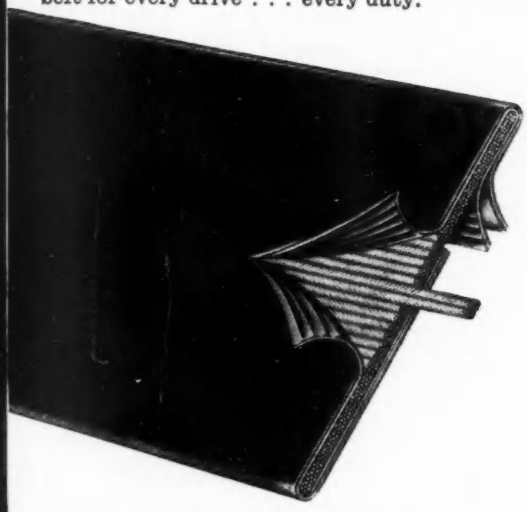
Thinner belt
3-T Cord belt is 25% thinner than belts of equal horse-power rating.



THE amazing new Goodyear 3-T cord process – successfully applied to motor car and commercial vehicle tyres – is also making transmission belts work harder, last longer and cost less for a given horsepower rating.

The synthetic cords are 'triple-tempered' – passed through a process at a controlled Tension and Temperature for a specific Time – to give them maximum strength and flexibility, minimum stretch. The result is that you can use a thinner belt – get improved flex life, longer wear, more efficient transmission and reduced maintenance.

There's a Goodyear 'job-designed' transmission belt for every drive . . . every duty.



NEW HD ENDLESS CORD BELT

The synthetic 3-T cords are *2½ times stronger* than cotton. This means longer service at lower cost on any drive. The special design of the belt eliminates splice failure and ply separation. HD Endless Cord costs no more, yet you get much higher horsepower ratings, better service all round.

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Transmission Belting
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THE GOODYEAR TYRE & RUBBER COMPANY (GREAT BRITAIN) LIMITED, WOLVERHAMPTON

ments. When an industry is dependent on world markets for its well being, this is measured by flexibility in adjusting the type and quality of its end products to stimulate and sustain demand.

All sections of the trade are working well below output capacity, and most firms welcome the annual July holiday stoppage as an opportunity to accumulate a reserve of orders. While the volume of business being booked is small it covers a wide range of household goods. Statistics just released by the N. Ireland Ministry of Commerce relating to linen goods exported from the U.K. during the five months ending May 31, for the years 1956-58 show a progressive decline in household and other textiles. The handkerchief trade has fared badly, the 1958 total being approximately 30% below that of 1956. Manufacturers of heavy linens for industrial uses have been more fortunate, with the volume of sail cloth or canvas exports increased by approximately 30% in the same period. Little interest is being evidenced in raw material, and any transactions relate mostly to low grade fibre. Prices have tended to ease slightly in recent weeks. Some damage to the growing crop has resulted from heavy rain but weather conditions have now improved. Practically all the sowing seems to have been the white flower variety so that the yield of high grade fibre will be small.

Jute Fibre, Yarns and Fabrics

Sales of new crop fibre this season are much smaller than usual. This, to a certain extent is due to restrictions by Pakistan against selling for shipment more than three months and also at prices below E.P.C. levels. Shippers are finding the position difficult because with few sales on their books, banks in many instances are refusing to assist financially in the purchase of jute for re-sale on a falling market. Reports of the new crop are still satisfactory and everything points to an outturn which will be sufficient to meet world demands of good class fibre. Small but steady arrivals are coming into baling stations from up-country in East Pakistan, but these quantities would be larger but for the fact that the Pakistani mills are purchasing fair quantities of new crop material.

Offers of new crop white jute are being freely made here but spinners are very difficult to interest, and the business passing is confined to small quantities for early shipment. Most shippers are offering at the E.P.C. levels for July/Aug. shipment, but it is possible to find sellers who would be willing to discount the market by amounts of up to £2 per ton for shipment a month further ahead. Mill Firsts are offered at £107, Mill Lightnings at £94, Mill Hearts at £84 and grade Hearts at £68, c.i.f. U.K., July/Aug. A fair amount of spot and afloat raw material is now available in the U.K., and spinners are purchasing small quantities. These spot and afloat parcels are not commanding a premium over shipment parcels and sellers are willing to dispose of them at current prices.

Offers of dark jute are not being freely made but this is only to be expected at this time of year. Very little old crop is now available and the few offers being made are confined to low grade material. As dark jute usually commences to be made for Sept./Oct. shipment this is more than three months ahead and not allowed by Pakistan regulations. Grade Tossa-2/3 is valued at £115 and grade Tossa-4 at £106, with Continental Tossa-2/3 at £99 10s. and Continental Tossa-4 at £81. Crack Daisee-2/3 is nominal at £104 and grade Daisee-2/3 at £96, c.i.f. U.K., July/Aug. Stocks of raw jute held by U.K. spinners are smaller than usual but owing to the recent weakness in the market and lack of demand for yarns and cloth they are allowing their holdings of raw material to run down. However, there is a feeling that very soon more buying interest will be shown by U.K. producers. Demand from the Continent has also been of small size but there has been some increase in demand from West Germany and this may be the forerunner of more buying from the Continent in general.

During the second half of June although shipment of Calcutta goods was held up by dock strikes in India, prices of cloth remained remarkably steady. This was possibly due to the knowledge that Argentina was again in a position to issue import licences and take delivery of contracts already placed. America and the U.K. were showing less interest in Calcutta goods but other consumers were continuing to take fairly regular deliveries. As was to be expected due to the hold up of shipment by the dock strike in Calcutta, the stocks of goods held by Indian mills at the end of June showed considerable increases compared with the end of the previous month. During the month hessian stocks increased by 6,000 tons and sackings by 16,100 tons. However, when these figures became known it had little or no influence on the market. Provided the necessary freight is available in July, the stock position should revert to the previous satisfactory level by the end of July.

Quotations are now at 61s. 9d. for 10 oz. 40 ins., and at 46s. 6d. for 7½ oz. with 11 oz. 45 ins. at 70s. per 100 yds f.o.b. Calcutta for July shipment. B twills were quoted at 147s. 6d. July. There has been a small business transacted to the U.K. for both hessians and sacking on this basis. Although prices of Pakistani raw jute has declined during the past month, there has been no decrease in prices of Calcutta hessians and this is most satisfactory from the point of view of U.K. manufacturers.

Demand for Dundee made yarns and goods is still disappointing and the business passing is still confined to small quantities for early delivery. Much short time working is still in force and it appears that this will remain the case until after the holiday period. The fact that most descriptions of yarns and cloth can be obtained for quick delivery and the raw material markets continue weak is no inducement for consumers to purchase in the forward position.

A great lack of orders is being felt in the Scottish linen trade. Buyers are not interested although prices are at a very low level for both yarns and cloth. Here again raw material markets are weak with the possibility of a further decrease in values with the result that end users are purchasing only their immediate requirements.

Man-Made Fibres and Fabrics

Recent Board of Trade figures regarding the output of man-made fibres generally are a little disturbing, but some opinion inclines to the view that the worst of the decrease is probably over. The figures, which include the output for the rayons and the synthetic fibres do not differentiate between the two, but it is believed that the greater part of the fall has been in respect of the rayons. In Lancashire, a slightly better tone has been evident in some dress fabrics, especially those with special finishes and also for furnishing fabrics with novelty weave effects. Printed furnishings are moving slowly and the immediate picture is depressing. The position in Yorkshire reveals some nicely blended "Terylene"/wool fabrics produced on the woollen system which are reported to be selling extremely well and for the heavier furnishing fabrics also, "Terylene" in blends with wool is finding favour with the public, although in the 100% fabrics the price factor is a matter which cannot be overlooked. Some blended cloths of wool and "Fibro" sell reasonably well, although the take-up by some of the retail houses is still on a hand-to-mouth basis.

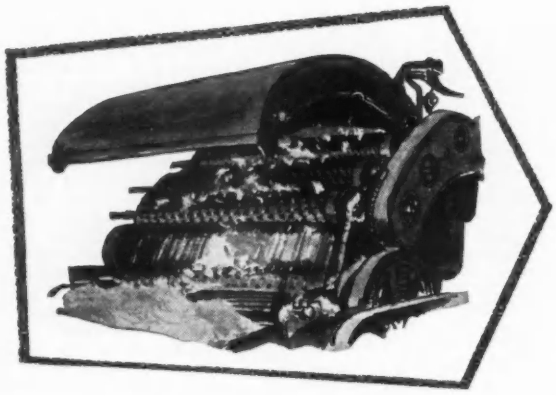
So far as the Leek area is concerned, business is probably slower now than at any time since the war. Only commission dyers and finishers appear to be holding their own and this is unlikely to continue if the volume of orders does not increase in the next few weeks. Orders for smallwares generally are quiet, although a steady request for laces and cords enables a proportion of the trade to continue working. Ribbon manufacturers are finding things very slow at present and the call for labels for the clothing industry is another case where more firm business would be very welcome.

Knitwear manufacturers complain of the apathy permeating trade in almost all aspects but the position is not quite so difficult with the bulked yarns and the goods made from them. The key to the whole situation is that wholesale houses are not buying in any quantity "in advance" and this, of course, creates accumulations of stocks by manufacturers.

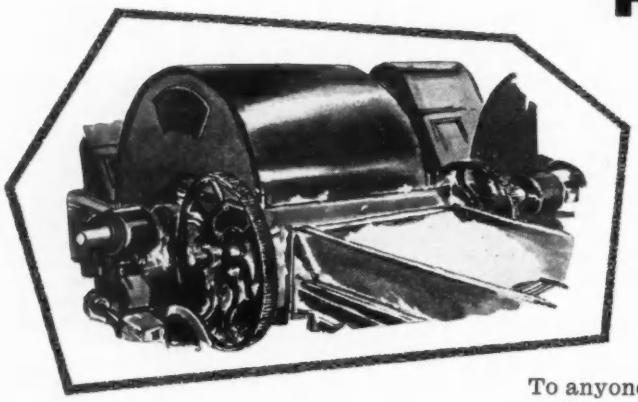
In the Macclesfield area screen and roller printing is quiet with little likelihood of any great change. Throwsters report diminishing order books although some advance orders show more interest in bulked yarns. Demand for tie fabrics is fairly good and "Terylene" is now in general call. Handkerchief fabrics, speciality dress fabrics and so on are only in limited call, and weavers are finding things increasingly difficult these days. From the Midlands increasing unemployment in the knitting and hosiery industries is reported, the main reason appearing to be a reduction in demand coupled with increasing imports from overseas.

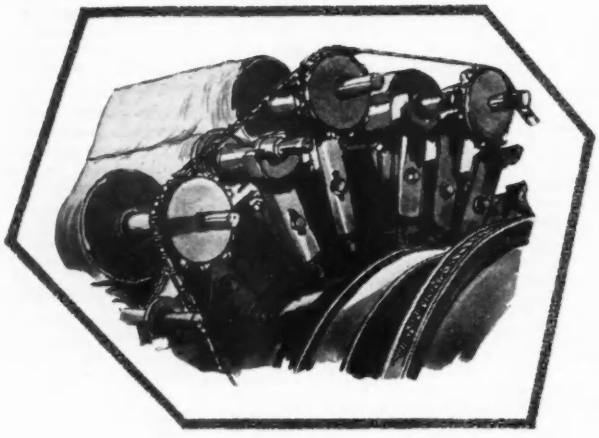
Exports to Colombia

The Export Credits Guarantee Department is notifying policyholders that cover for business with Colombia is once more available. Although Colombia's payments position is still difficult, there has been some improvement recently, and E.C.G.D. considers that a basis for cover once more exists. Where business involving a credit period between 6 months and three years is covered under an Endorsement providing E.C.G.D. with a spread of such business, normal cover for 85–90–95% of loss will be available. For such business underwritten specifically, and for all medium term (up to a maximum of 5 years' credit) business, E.C.G.D. liability will for the present be limited to 75% of loss.



DO YOU RECOGNISE THESE?





To anyone in textiles a rag grinder, a tenterhook willey and a carding engine are so familiar that they are hardly worth a second glance. But they are worth a second thought—for friction and foreign matter in these machines have been the starting point of many a disastrous fire.

Today, however, the fires that they cause in raw materials and fly can be stifled in seconds with a fine cloud of dry powder. Electrical and oil fires can also be killed completely, before they take hold. *Today is the new age of Nu-Swift.*

Every Nu-Swift extinguisher is designed to fulfil a specific function in a complete system of fire protection. There is a Nu-Swift extinguisher for every risk and every extinguisher is operated in the same upright commonsense way. That is why industry and commerce in seventy countries rely on Nu-Swift extinguishers for easy handling and certain operation

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IN THE NORTH to Nu-Swift Ltd., (Dept N173), Elland, Yorkshire. (Elland 2852)

TMP3

Notes and News

South Africa's Leading Wool Customer

The U.K. has been the biggest buyer of South African wool for the eleventh successive year. Export figures prepared by the South African Wool Board's statistical office show that in the season ended June 30 the U.K. took nearly 48 million lbs. greasy and scoured wool, followed by France with 40 million lbs. The six leading buyers of the Union's clip remained the same as in the previous season. The United Kingdom and France were followed by Germany (32 million lbs.), Italy (25 million lbs.), Russia (23 million lbs.), and the United States (18 million lbs.). Then came Belgium (12 million lbs.) and Japan (7 million lbs.).

U.S.A. Wool Cloth Quota Filled

The National Wool Textile Export Corporation announce that the U.S.A. wool cloth tariff quota of 14·2 million lbs. for the year 1958 has now been filled and, for the remainder of the year, the *ad valorem* duty on such imports into the U.S.A. is increased from 25 to 45%. Commenting on this, Mr. J. D. Hood, chairman of the Corporation, says filling of the quota is already having adverse effects on the British woollen and worsted industry, and it is anticipated that total exports of British woollen fabrics to thy U.S.A. during 1958 will be considerable smaller than last year owing to the reluctance of American buyers to pay the increased rate of duty. The tariff-quota, comments Mr. Hood, is another instance of protectionism failing to protect the U.S. domestic industry, the position of which has continued to worsen during the three years since the quota was first invoked. "The U.S. administration seems to have realised that the tariff quota is not an ideal way of regulating trade," says Mr. Hood, "as indicated by the President's action in requesting Commerce Secretary Sinclair Weeks to undertake a study into alternative methods in its application." Mr. Hood adds that the Export Corporation plans in the near future to submit recommendations on this subject to the Committee for Reciprocity Information.

"Sevron" Dyes for Men's Wear

The increased importance of "Orlon" acrylic fibre for men's war has brought about the development of three new dyes especially for this fibre, announce Du Pont. "Sevron" Yellow 3RL, "Sevron," Red GL and "Sevron" Blue BGL are for use in such shades as tan, grey, brown, and beige. "Sevron" Blue BGL, it is pointed out, can be combined with equal parts of "Sevron" Blue B to improve monotone fading of tans, greys and blue-grey shades, while the two blue dyes in a one-to-one blend will produce an extremely fast royal blue. In combination with "Capracyl" dyes for wool, "Sevron" Red GL and "Sevron" Yellow 3RL are suited for dyeing blends of the two fibres. "Sevron" Blue BGL, however, has an affinity for wool, and its use may result in staining of the wool component.

Creases and Pleats in Wool Garments

Durable creases and pleats in wool garments are stated to be a practicable proposition when they are treated with a dilute chemical solution, the creases then being set by steam. Albright and Wilson (Mfg.) Ltd., has been licensed to make and sell the solution ready for application; the concentrated solution is known as SI-RO-SET. It is anticipated that the process will attract considerable attention from clothing manufacturers. A demonstration unit is to be set up by Albright and Wilson Mfg. at its Technical Service Dept. headquarters at Oldbury, Birmingham. Further information is available from the Organic Chemical Sales Dept., Albright and Wilson Mfg., 1 Knightsbridge Green.

Moquette Loom Wire Motion

George Hattersley and Sons Ltd., Keighley, have signed an agreement with M. Dewaele of Harelbeke, Belgium, to manufacture under licence his wire motion for moquette looms. which, covered by British, French, American and German patents, has achieved wide popularity in Belgium where over 600 units have been made.

The mechanism is placed below the level of the slide rail, which ensures safety and allows easy access to the pile wire slide. As this is mechanically connected to the operating arm, it is possible to run at speeds up to 120 p.p.m. without the slide hitting the stop. The wire is inserted fast and withdrawn slowly, whilst the geometry of the motion allows the pile wire slide to hesitate whilst it picks up a fresh wire. The slide rail and supporting rail are designed so that the shuttle and raceboard can be higher than hitherto, thus allowing the centre shed to be horizontal. This loom is also fitted with the +GF+ pirn changing motion and other interesting features, including the Warner magnetic brake and push-button control.

Apprentice Scheme for Man-Made Fibre Technologists

To help in securing a regular flow of young people into the industry, the British Man-Made Fibres Federation and the Silk and Rayon Users' Association are jointly responsible for a booklet "Apprenticeship in the Silk and Man-Made Fibres Textile Industries." This has received the approval of the Ministry of Education and is being sent to all local education authorities in England and Wales as well as headmasters of public and independent schools, youth employment officers and to all appropriate firms in the industry. The booklet contains a model form of indenture for apprentices and recommended courses of training. It provides school leavers and careers masters with precise information on the training and prospects in these industries.

Library Guide.—"What's Available in the Technical Library?" by the librarian of Manchester Technical Library, offers students, research workers and "do-it-yourself" laymen an admirably informative survey of the library's resources other than its 80,000 books.

Over 1,600 scientific and technical periodicals are currently received and, to enable readers to make full use of the files, Mr. Taylor describes the many periodical indexes, abstracting services and other bibliographical aids available. The library's collection of patents, standard specifications and atomic energy documents are also described. Copies can be obtained, free of charge, from the Technical Librarian, Central Library, Manchester. (Telex 66-149 or Tel. No. CEN 7401).

Crofts Activities in N. America

Crofts Engineers (Holdings) Ltd. announce the opening of a subsidiary company, Crofts U.S.A. Ltd. (with headquarters in Chicago) to deal with trading activities in the U.S.A. Following on the recent acquisition of new and larger head office and works in Montreal and Toronto for Crofts Canada Ltd., the new American company is a development of the group's policy of vigorous expansion overseas. These arrangements are the outcome of visits by Sir Arthur Croft, chairman of the group, and Mr. F. Rotheray, export sales manager, aimed at bringing Crofts trading throughout North America under unified overall control of the parent company.

European Common Market

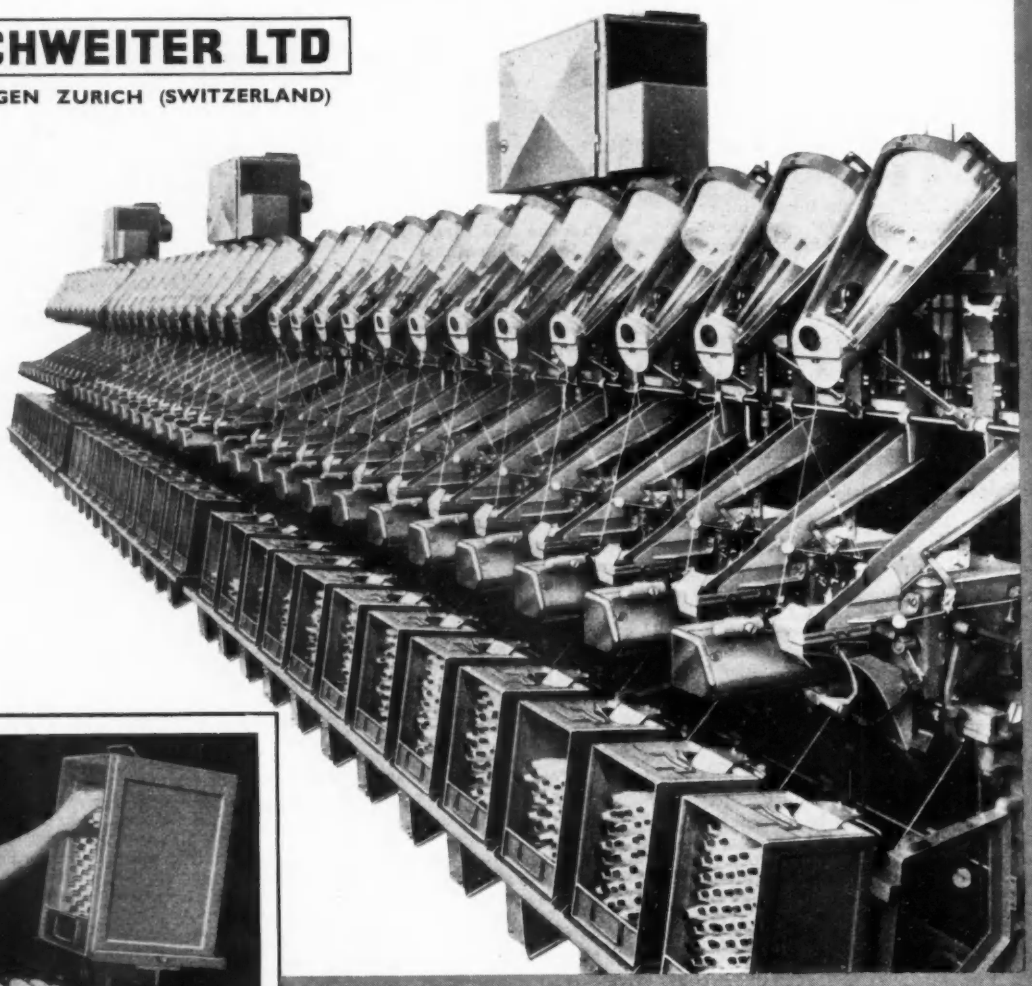
Reading List No. 6 in the European Economic Co-operation Series issued by the Manchester Commercial Library includes a number of newly-published German directories in addition to books, pamphlets and periodical articles. Copies of the list can be had on application to the Commercial Librarian, Central Library, Manchester 2. (Cen. 7401. Telex 66—419.)

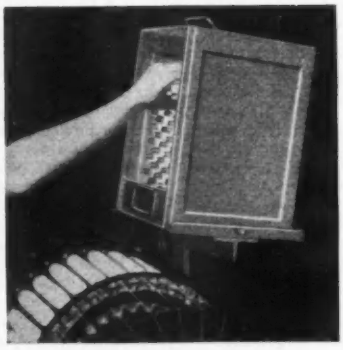
Sliver Irregularity

The concern expressed by users of regularity testers at the different figures for the amount of irregularity in slivers and yarns, and sometimes even on testers of the same type supplied by the same manufacturer is referred to in a report recently issued by Textile Institute following investigations carried out by Sliver Irregularity Panel of Technical Committee A. According to the report. "Regularity testing as at present carried out is in fact sufficiently reliable to be used as a basis for important decisions only when tests are made carefully and are compared with control tests made on the same regularity tester. Owing to the different principles of measurement employed in the different

SCHWEITER LTD

HORGEN ZURICH (SWITZERLAND)





Fully wound bobbins are easy to fill in the loom battery. Exchanging of empty boxes for full ones is very simple.

Packer boxes are to be stacked very easily. 70 boxes totalling up to 7,000 pirns moved at one time.

PIRN WINDER TYPE MSL

This super automatic Pirn Winder is suitable for cotton, spun rayon, and wool, and provides the answer to many problems of increased production, improved quality, etc. Fitted with automatic pirn feeding device and the Schweiter 'Packer' Automatic Pirn Packing Device. Automatic Suction Dust Remover ensures clean pirns and reduced stoppages.

The ROTOR device for tailless pirns eliminates tail ends at beginning of pirns by covering them with normal winding.

Automatic Suction Dust Remover is a new and highly successful innovation. Keeps workrooms and machines clean and ensures an improved yarn quality.

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LIVESEY & ASPINALL LTD.

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Visit the Schweiter Stand No. 1508 at the Textile Recorder International Textile Machinery and Accessories Exhibition, Belle Vue, Manchester October 15th - 25th, 1958

types of regularity tester and to differences in the details of application of these principles, complete standardisation of regularity testing is hardly possible at the present time. Nevertheless much could be done to improve the reproducibility of results from one design of instrument, and to reduce the differences between testers of different design."

The report is divided into three parts:

(1) Definition of an absolute measure of irregularity as an ideal to which practical measures may be referred;
(2) Conditions for reproducibility within and between regularity testers;
(3) Specification of those conditions which can at present be standardised.

The adoption of this specification, says the Institute, should ensure that all testers of the same design would give the same results. On the other hand, while it would reduce the uncertainty of the differences between testers of different design, it would not guarantee that the measurements obtained upon them would be identical.

Two types of tester are dealt with (*a*) those which employ the change in capacity of an electrical condenser, and (*b*) those which measure the thickness of slivers and rovings after compression into a rectangular groove (compression-type testers) but many of the principles involved would apply also to other types of tester.

The irregularity of a sliver, roving or yarn can only be specified completely by a function such as the variance-length relation or the spectrum, which gives the distribution of the irregularity over a complete range of lengths. Nevertheless it is usual to measure the amount of irregularity of the material, and it is with the standardisation of the measurement of this figure that the bulk of the report is concerned. Experience of more complete measures of irregularity such as, for example the separate measurement of short- or long-term irregularity is insufficient to enable these measures to be standardised. The figure for the irregularity may either be calculated from a regularity trace or obtained from an integrator attached to the tester.

B.N.S. Gift to New College

British Nylon Spinners Ltd. will contribute £25,000 to the new men's college at Oxford. Altogether leading industrial firms have promised £610,000 of the estimated cost of £2,350,000. The college, to be named St. Catherine's, will provide places for 400 men, half of them students reading for degrees in science, engineering and mathematics. It is expected that part of the new college will be open in October, 1961.

British Machinery for Russian Factory

Courtaulds Ltd. have concluded negotiations with Technopromimport, Moscow, for a contract to supply machinery for a factory being constructed in Russia to manufacture cellulose acetate yarn from Russian made raw materials. Some of the machinery will be fabricated in Courtaulds' workshops at Coventry; some will be supplied by other U.K. firms. Courtaulds have undertaken the responsibility for supervising erection of the machinery and putting the factory into production. The value of the contract amounts to some millions of pounds.

New Cotton Board Films

The Cotton Board has just added to its film library two new 16 mm. sound and colour films, "Village Wedding" and "Needle and Cotton." The two new films enable the Cotton Board to offer to women's groups a varied and entertaining film evening in which different aspects of cotton's attractiveness, versatility and usefulness are displayed. Other films include "Any Questions on Cotton," a forum on the usefulness, qualities and treatment of cotton over which Freddy Grisewood presides; "Jacqueline Mackenzie Buys Britain's Cottons," in which the television performer makes herself typically at home amongst three groups of cotton merchandise; and "Spun, Woven and Finished" in which the development of a cotton fabric from the cotton field to the finished cloth is outlined. Last year Cotton Board films were shown on 545 occasions to audiences totalling over 40,000. This year 569 shows, including 172 lectures, have already been booked and over 30 one-week film tours have been arranged to many parts of the country.

"Courtolon X-10"

A new bulked nylon yarn ("Courtolon X-10") specifically developed for easy-care knitted outerwear and underwear is announced by Courtaulds Ltd. For months now the research and production staffs have been co-operating to perfect a special version of standard "Courtolon," Courtaulds' resilient-stretch nylon yarn used largely for stockings and half-hose. Emphasis has been placed on producing a knitting yarn for outerwear and underwear of the correct resilience and which combines high-bulk, soft handle and a minimum tendency to "snagging." The easy-care garments produced from "Courtolon X-10" have given such encouraging results that Courtaulds are now producing commercial quantities of the new yarn with prices only a few pence per pound above those current for standard "Courtolon."

Textile Institute Honour

Honorary membership of the Textile Institute has been conferred on Mr. F. L. Barrett, Dipl. Tech. Chem., F.R.I.C., F.T.I., of the Bleachers' Association Research Laboratories, Bromley Cross, near Bolton.

Change of Address

The head office of Incorporated Plant Engineers—formerly at Solihull—is now at 2 Grosvenor Gardens, London, S.W.1.

New Companies

Eternal Nylons Ltd. Private. Reg. May 30. Capital £200 in £1 shares. Spinning, manufacturing and dealing in nylon, rayon, etc. Registered Office: 29 Park Lane, Salford, Lancs.

G. C. Brent Ltd. Private. Reg. May 29. Capital £5,000 in £1 shares. Agents, manufacturers and dealers in textile machinery, etc. Registered Office: 2 West Bank, Bradford, 9.

Palette Designs Ltd. Private. Reg. May 29. Capital £1,000 in £1 shares. Textile designers. Solicitors: Boote Edgar & Co., Manchester.

T. Hector Sykes Ltd. Private. Reg. June 3. Capital £1,000 in £1 shares. Combers, doublers, spinners, manufacturers and dealers in wool, silk, cotton, etc. Registered Office: 75 Reinwood Road, Lindley, Huddersfield.

S. Lumb and Sons (Batley) Ltd. Private. Reg. June 4. Capital £20,000 in £1 shares. Yarn winders, etc. Registered Office: Cheapside, Bradford Road, Batley, Yorks.

North Lancashire Hosiery Company Ltd. Private. Reg. June 4. Capital £5,000 in £1 shares. Hosiery, woollen, worsted and cotton yarns spinners, wool and knitwear merchants, etc. Registered Office: Trinity Works, Market Street, Preston, Lancs.

Reliance Waste and Wiper Company (Wilts.) Ltd. Private. Reg. June 6. Capital £2,000 in £1 shares. Manufacturers of wiping rags and cloths, etc. Registered Office: 54 Cannon Street, E.C.4.

Rhondda Waste Trade Co. Ltd. Private. Reg. June 6. Capital £1,000 in £1 shares. Manufacturers, importers, exporters and wholesale and retail dealers in salvage, waste paper, scrap metals and waste products of all kinds. Solicitors: Victor Mishcon & Co., Norwich House, Southampton Place, W.C.1.

West European Trade Ltd. Private. Reg. June 6. Capital £1,000 in £1 shares. Importers, exporters, merchants, manufacturers and dealers in woollen, worsted, mohair, alpaca, cotton, silk, nylon and other yarns and wool, etc. Registered Office: 35 Princess Row, Leicester.

L. and F. Wild Ltd. Private. Reg. June 1. Capital £20,000 in £1 shares. Wool merchants, importers, exporters, manufacturers, dealers in wool, waste, cotton, alpaca and all other fibrous substances, products and materials. Solicitors: Sullivan, Dennison and Co., Bradford 1.

Terlon Textiles Ltd. Private. Reg. June 17. Capital £1,000 in £1 shares. Processors, manufacturers and dealers in yarns and textiles of all kinds. Registered Office: Bridge Mills, Long Eaton, Nottingham.

Suntex (Job Merchants) Ltd. Private. Reg. June 20. Capital £2,000 in £1 shares. Manufacturers, job and stock buyers, importers, exporters and wholesale and retail dealers in cloth, wool, worsted, plush and other textiles, etc. Registered Office: 48 Atlantic Chambers, 7 Brazennose Street, Manchester 2.

Northgate Textile Company Ltd. Private. Reg. June 23. Capital £500 in £1 shares. Manufacturers, merchants, factors and retailers of cotton and other overalls, frocks and garments, etc. Registered Office: 36A North Hill, Colchester, Essex.

Adelphi Company (Eastern) Ltd. Private. Reg. June 23. Capital £7,500 in £1 shares. Manufacturers, converters and dealers in wool, flax, hemp, jute, cotton, silk, etc. Registered Office: 11 Gresham Street, E.C.2.

E. Jaye Ltd. Private. Reg. June 24. Capital £5,000 in £1 shares. Manufacturers and dealers in cloth, wool, worsted, etc. Registered Office: 7/13 Tempest Green, Bradford 6.

Famous Fabrics Ltd. Private. Reg. June 26. Capital £25,000 in £1 shares. Merchants, bankers, traders, commission agents, shipowners, carriers in the United Kingdom and India or elsewhere. Registered Office: Creechurch House, Creechurch Lane, E.C.3.

Macclesfield Mills Ltd. Private. Reg. July 2. Capital £5,000 in 2,500 "A" and 2,500 "B" shares of £1. Manufacturers and dealers in hosiery, knitwear and knitted goods of all kinds, etc. Registered Office: 3 Oxford Street, W.1.

H. M. and B. Andjel Ltd. Private. Reg. June 30. Capital £40,000 in 4,000 "A" and 36,000 ordinary shares of £1 each. Manufacturers, dealers and shippers of worsteds, yarns, tweeds, etc. Registered Office: 3 York Place, Leeds.

F. and D. Wilson Ltd. Private. Reg. June 30. Capital £5,000 in £1 shares. Merchants, exporters, importers of wool, tops, noils, waste, yarns, worsteds, etc. Registered Office: Holme Top Mills, Bradford 5.

Cloth Supplies Ltd. Private. Reg. July 10. Capital £1,000 in £1 shares. General textile merchants, etc. Registered Office: 76 Victoria Street, Manchester 3.

Technical Felts Ltd. Private. Reg. July 11. Capital £5,000 in £1 shares. Registered Office: Bridge Mills, Edenfield, Ramsbottom, Lancs.

Controlled Start Equipment

This Metrovick equipment has been successfully applied to spinning frames, take up reel drives, etc.; it can be simply adapted for all applications where smooth, controlled acceleration is required, regardless of load conditions.

Mechanically operated Perigrip brake with type TSS controller and Bowden Cable attached.

500,000 SPINDLES TURN WITH METROVICK DUAL MOTOR DRIVES IN CONTROL
For smooth running-up, Metrovick hand-operated Controlled Start Equipment is used with these drives.

Note these Important Features

- Hand operation by Bowden Cable.
- Electrical interlocking in the TSS controller.
- Incorporates the main features of the Electrical Perigrip.

METROPOLITAN-VICKERS
ELECTRICAL CO LTD · TRAFFORD PARK · MANCHESTER, 17

An A.E.I. Company

Equipment for the Textile Industry

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RECENT TEXTILE PATENTS

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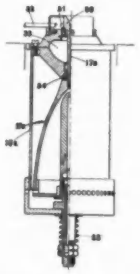
779,773 Spinning or Doubling

C. PUJOL, *Calle Corinto*, 3, *Barcelona, Spain*

A device for the continuous spinning, twisting or doubling of fibres at high speeds. A container fitted with a hollow vertical shaft is mounted for rotation about its longitudinal axis, the inside wall of the container being of curved generatrix and constituting a surface of revolution which gradually increases in diameter from its upper part which forms a continuation of the channel in the hollow shaft for the passage of the material, to the bottom of the container, where its diameter is a maximum. A streamlined central vertical stem inside the container extends from the bottom of the container, so that the upper end of the stem is opposite the lower mouth of the

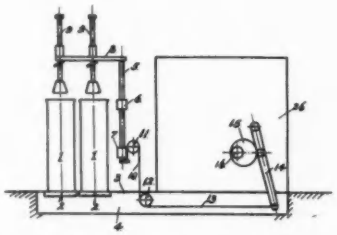


above channel, and a series of radial openings in the lower part of the wall of the container allow for the discharge of the air which enters the container through the upper channel. In the construction shown, the container 10*a*, is rotated by means of an air turbine. The upper end of the container is connected to a hollow shaft 17*a* the upper end of which forms a rotor 30 with blades 31. An air inlet 32 serves to direct a jet of air on [to the blades to rotate the rotor and consequently the container. An oil chamber 33 surrounds the shaft and an oil-tight packing is provided at 34. The outer casing 15*a* is resiliently mounted on a helical spring 35.

780,041 Sliver Can Packing Mechanisms

FAIRBAIRN LAWSON COMBE BARBOUR LTD., *Wellington Foundry, Leeds* 1.

Describes an improved form of can packing mechanism for drawframes. Sliver cans 1 stand on their rotating tables 2 in the bed of the machine 3. A channel 4 is provided below floor level to take the tables, and accommodate the drive to the can packing mechanism. The latter consists of a slidable rod 5 carried in bearings 6, 7, fixed in a vertical cylinder (not shown). The rod carries a "V" or "X" shaped top 8 at its upper end, the top bearing one or more weighted sliver packing heads 9. The lower end of the rod is connected to a chain 10 running over a wheel 11,



tension in the chain being arranged to move the rod upwards. The lower end of the chain is fastened to a wheel 12 fixed to a shaft running across the front of the machine and below the level of the can tables. The wheel carries a further chain 13 which passes at right angles to the shaft to the lower end of lever 14 which is oscillated by means of a cam 15 fastened to a shaft 16 which is driven at a suitable speed. When the machine is operated the cam causes the lower end of the lever, to move backwards and forwards at an appropriate rate, the chain 13 rotating the wheel 12 to a limited degree in one direction and then allowing it to rotate in the other. This causes chain 10 to move the rod 5 up and then down together with the top 8 and the packing heads 9.

780,047 Ring Spinning or Doubling Machines

VEB SPINN- UND ZWIRNEREIMASCHINENBAU KARL-MARX-STADT, 8 *Lärchenstrasse, Karl-Marx-Stadt* 31, *Germany*.

A spindle for a ring spinning or twisting machine comprises an electric motor, and a bobbin spindle extending through the motor and connected with the rotor of the motor the end of the spindle on one side of the motor being mounted in a bearing. Means provided on the opposite side of the motor for centralising the spindle consists of a disc of magnetic material secured to the spindle and a magnet arranged concentrically with the disc, centralisation of the spindle when rotating resulting from the combined action of the centrifugal force of the disc and a magnetic field set up by the magnet.

780,244 Production of Films on Fabrics

BRITIONA CHEMICALS LTD., *Mulkern Road Works, London, N.*19.

Method of forming a film of synthetic resin (which is insoluble in the plasticiser at atmospheric temperature) upon a fabric. The process comprises forming a plastisol dispersion of the resin in a plasticiser which at elevated temperatures is a solvent for the resin without the addition of a volatile solvent, and successively casting and curing a number of films of the dispersion one upon another, each film being at least partially cured before a subsequent film is cast. The fabric as applied to the last film before curing and the plastisol film and fabric is subjected to an elevated temperature to cause the resin to go into solution in the plasticiser and to cure the film so formed. The cured film is bonded to the material without appreciable penet.ation into the fabric.

780,255 Automatic Doffing of Ringframes, etc.

C. O. MULLENSCHLADER, *Oberwiehl, Rheinland, Germany*.

A ring spinning or twisting machine having means for exchanging spindles with fully wound bobbins for spindles with empty bobbins without interrupting the spinning or twisting process. At least two spindle rails are provided, each having a row of driven spindles interconnected by driving means with one another and to a common driving member mounted on the spindle rail. The spindle rails are mounted so as to be movable transversely to their longitudinal length in relation to a ring rail having a single row of rings. The spindle rails can successively be brought into an operative position with respect to the ring rail, the driving member being connected in driving engagement with a power unit when the spindle rail is in the operative position to effect rotation of all the spindles.

780,334 Roller Drive on Woollen Mules

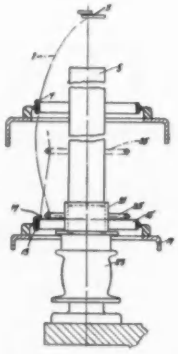
WILLIAM WHITELEY AND SONS LTD., *Prospect Ironworks, Lockwood, Huddersfield*.

Describes a mule in which the rollers are adapted to deliver a short length of slubbing at the commencement of the outward run of the carriage by means of a drive additional to the ordinary drive to the rollers, the additional drive being adapted to be started each time the carriage reaches its inward limit of movement. The additional drive is provided by an additional motor adapted to be started each time the carriage reaches its inward limit of movement and to be stopped after a predetermined time.

780,417 Improvements in Winding Nylon Yarn

BRITISH NYLON SPINNERS LTD., *Pontypool, Monmouthshire*.

Describes improvements in the winding of nylon thread. The yarn 1 is led from a stretching apparatus through a guide 3 positioned above a spindle having a yarn-receiving member 5. The yarn is led through the traveller 7 and thence led to the (secondary) traveller 13 of a ring 15 and is positioned on a hook 17. The ring 15 is mounted on a ring-rail 19 which is connected to an operator-controllable treadle which serves to determine the height of traveller 13. Ring 15 is located to surround the base of the member 5 and a waste auxiliary tube 21 is fitted loosely around it and seated on the spindle whorl 23. The yarn is, initially, held in engagement with

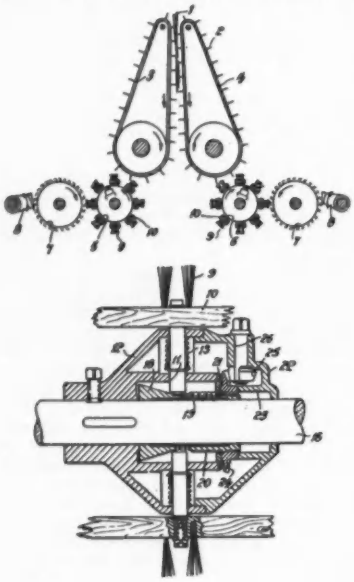


traveller 13 by movable trapping ring 25 which is normally positioned close above the secondary ring 15 in such a way as to bear down on the yarn and hold it round the hook 17 while initial winding is taking place. The ring is provided with a handle having a vertical rod integral with it, this rod being located in a boss on the ring-rail 19 so that it may be moved up to position 25 when the main winding is desired to be started. The yarn is carried by the trapping ring 25 out of the hook 17 so as to be controlled by the main traveller 7.

780,514 Hackling Machines

VEB SPINN- UND ZWIRNEREIMASCHINENBAU KARL-MARX-STADT, 8, *Lärchenstrasse, Karl-Marx-Stadt, Germany.*

Describes a hackling machine with an improved brush roller. The fire bundles 1, which are held in clasps hang down freely and are passed between the hackle bar lattices 3 and 4 provided with hackle pins 2. The tow which is combed out from the bundles is doffed from the hackle pins by the brush roller 5 and transferred to the hooks of the tow doffer 7 from which the tow is removed by the take-off member 8. Each of the two brush rollers has boards 10 which carry bristles 9 and are secured to the rollers by supports 11. The supports are arranged in casings 12 so as to be radially adjustable and are urged towards the driving shaft 16 by springs 13. A ring



18 having a conical outer surface is slidably mounted on shaft 16 and the supports 11 are pressed against the ring by means of the springs 13 against the centrifugal force occurring during rotation of the brush roller. By means of axial displacement of the ring, the boards 10 are radially adjusted. The conical portion 18 merges into a cylindrical portion into which is cut an oblong groove 19 and a thread 20. A tongue provided on the inner rim of a ring 21 projects into slot 19, and the ring 21 is secured to a cylindrical part of the casing 12. A bevel 24 is carried by the cylindrical part of ring 18 between ring 21 and a portion 23 of the lid 22. A female thread cut into the hub of the bevel 24 engages the thread of ring 18 so that on turning the wheel, the ring 18 is displaced which in turn results in an adjustment of the brush boards 10. The turning of wheel 24 is effected by a second wheel 25 carried by a stub axle 26. One end of the axle 26 projects through the lid 22 and is shaped as a square head so that it may be turned by a spanner. In this manner the diameter of the brush roller can be adjusted in case the bristles become worn.

780,611 Yarn-Winding Machine

FOSTER MACHINE CO., *Westfield, Massachusetts, U.S.A.*

A yarn winding machine has a combination of traverse and drive rolls, and a support for carrying a bobbin upon which a package is to be wound by friction drive between the drive roll and package surface. Means are provided for mounting the bobbin support to move along a curved path the axis of which is offset from, but parallel to, the axes of the drive and traverse rolls, with the drive roll centre lying between the centre of curvature of the path followed by the support and the traverse roll centre when viewed in transverse section. The rolls and bobbin support are relatively so positioned that the curved path, when extended, intersects the line of centres between the traverse and drive rolls at a position between the rolls and that a uniform distance between the surfaces of the rolls is constantly maintained.

780,750 Sley for Ribbon-making Looms

G. M. V. J. CHOUPIN, 9 *Rue de la Bourse, Saint Etienne (Loire), France.*

Improvements in the design and in the execution of an automatic shuttle-changing system for the sley of ribbon-making looms. The shuttle comprises a front and a rear part, the parts being separable one from the other. The rear part is permanently engaged in the sley of the loom and receives a front part of a shuttle coming from the magazine. The magazine comprises a plunger element actuated at the moment of each exchange by the front of a shuttle, and a notching system to push, into engagement with the rear part, the replacement front of the shuttle, whilst at the same time not influencing the other front parts of shuttles in the replacement magazine when the plunger returns to the inoperative position.

780,770 Winding Yarn

UNIVERSAL WINDING CO., 1655 *Elmwood Avenue, Cranston, Rhode Island, U.S.A.*

A winding machine comprises a rotatable arbor for holding a yarn package, means for applying rotation to the arbor, and means for rotatinga drum at a speed such that its surface speed is equal to the predetermined winding speed. Means are provided for supporting the arbor for movement towards and away from the drum whereby the periphery of a package carried by the arbor can contact the drum to permit it to modify the rotation to cause the package and arbor to rotate at the predetermined winding speed.

780,803 Dyeing and Printing

SCOTT BADER AND CO. LTD., *Wollaston, Wellingborough, Northamptonshire*

A process for printing or dyeing on a machine such as the foulard machine, with vat dyestuffs, characterised by printing or dyeing with a paste containing a vat dyestuff, a thickener and formamidine sulphinic acid otherwise known as thiourea dioxide as reducing agent, then padding in a bath consisting essentially of an alkali metal hydroxide such as sodium hydroxide which contains no hydrosulphite. The material is then subjected to a short steaming process followed by an oxidising treatment of the usual kind.

780,840 Warping Creels

THOMAS HOLT LTD., *Atlas Iron Works, Whitworth Road, Rochdale.*

A warping creel comprises a frame having vertical arranged shafts revolvably mounted at opposite ends in the frame and spaced in close proximity. Brackets on each of the shafts have pegs for receiving yarn packages, there being two pegs on each bracket projecting at right-angles to the vertical centre line of the shaft. Thread guides are mounted on each shaft adjacent to the respective supporting brackets. Tension devices are in spaced relationship with the respective package pegs, and means are provided for imparting a turning movement to the vertical shafts when desired.

781,006 Fibre Drying Apparatus

SAMUEL PEGG AND SON LTD., *Barkby Road Works, Leicester.*

A method of drying fibres in which the packages are disposed at a drying zone in a closed circuit through which air is circulated at a low pressure. This air is heated prior to passing into contact with the yarn and then cooled to condense entrained moisture before returning to the heating stage. The condensed moisture is drawn off the circuit through a valve at a draining zone in the circuit between the air cooling and heating zones and automatically opened for the passage of the condensed moisture in response to the collection of a sufficient amount of moisture to preclude the passage of air through the valve.

781,021 Bobbin Strippers

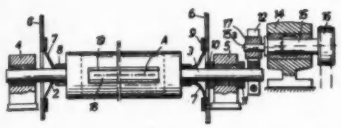
TERRELL MACHINE CO., 3,000 *South Boulevard, Charlotte, North Carolina, U.S.A.*

A bobbin stripper for removing waste yarn from a spent bobbin comprises a pair of stripping jaws, the gripping faces of the jaws being rigid and having an arcuate profile with small, smooth-faced, raised portions spaced over the entire extent of the gripping faces. The spacing of the raised portions is such as to provide a gripping action by the raised portions on any waste yarn there may be on the barrel of the bobbin and to prevent bunching of any of the yarn.

781,174 Guiding Fabrics or Yarns through a Treating Medium

MASCHINENFABRIK BENNINGER A.-G., *Uzwil, Switzerland.*

Apparatus for treating products of fibrous material, which are to be guided through a treating medium. The apparatus comprises a tube supported in bearings 4 and 5 by means of inserted stub shafts 2 and 3. The stub shafts traverse apertures in opposite walls of the tank 6 containing the treating fluid and are surrounded by resilient collars 7, unaffected by the fluid of tank and are retained on the stub shafts as well as on tank 6 by means of rings 8 and 9. Two set collars 10 and 11, mounted on



the stub shaft 3 and find abutment at the bearing 5, secure the body 1 against axial displacement. A fork 12 is fastened at the free end of stub shaft 3. 14 designates a bearing traversed by a shaft 15 carrying the pulley 16 and an eccentric pin 15a. The latter is in engagement with a slide ring 17, positioned between the legs of the fork and which, when shaft 15 is driven, sets the fork into an oscillating motion, which is transmitted to the operating tube 1 by the stub shaft 3. The hollow cylinder 1 immersed in the fluid has at two opposite places a slot 18 for the passage of the web A to be treated. Two parallel flanges 19 are attached to each of the two slots 18. The stretched web is passed through the body 1 and thus does not contact the flange 19.

781,190 Weft Insertion on Shuttleless Looms

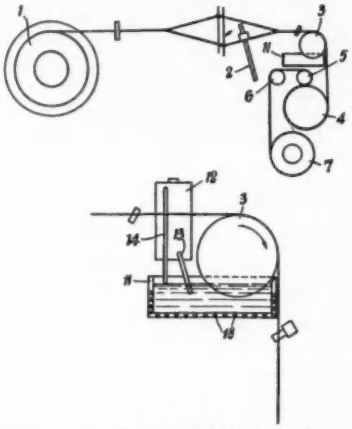
SULZER FRERES, SOCIETE ANONYME, *Winterthur, Switzerland.*

A loom in which different weft threads are drawn selectively from at least two bobbins mounted outside the shed, the threads being transferred by weft changing and transfer mechanism, in any selected sequence, to weft inserting elements which insert the selected thread into the shed. Associated with each of the wefts are a tensioning device and a take-up device, and there are driving members each common to all the devices of one kind. A control element selectively connects to the driving member for the devices of each kind that is associated with the selected thread.

781,191 Weaving Glass, etc. Fabrics

ALGEMEENE KUNSTVEZEL MAATSCHAPPIJ NAAMLOOZE VENOOTSCHAP, 261 *Benoordenhoutseweg, Hague, Holland.*

A method of manufacturing fabric from smooth surfaced materials. The loom comprises a cylinder 1 from which the warp threads pass, a reed 2, a breast roller 3, tension rollers 4, 5 and 6, and a take-up roll 7. The roller 3 acts as a means for sizing the surface of the fabric. The lower part of the roller is immersed in a tank 11 containing sizing solution which is maintained at a constant level in the tank. To maintain the sizing solution at a constant level there may be provided a storage tank 12 which is closed to the open air. When

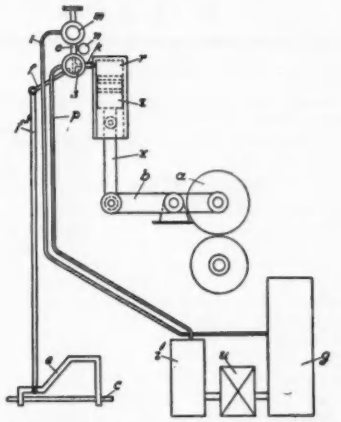


the contents of tank 11 fall, air is allowed to pass through the tube 14 into the storage tank 12 and size flows down the conduit 13 to restore the level of the tank to its datum. When the tank is filled to this level the lower end of the air tube 14 is closed by the solution and no further solution can flow into the tank. The temperature of the tank is maintained at a desired level by heating elements 18. With the exception of the sizing device, the loom is of standard construction and the actual weaving takes place in any known manner.

781,324 Reducing Squeezing Pressure on Sizing Machines

E. KENK, 55 *Stuttgarter Strasse, Ebersbach/Fils, Germany.*

A device for reducing the wringing pressure during slow running in a warp sizing machine. The device comprises a wringing roller *a* mounted in bearings in a



double lever *b*. In a pressure cylinder *r* is a pressure piston *z* which is connected to lever *b* by means of a pressure rod *x*. Screwed to the cylinder *r* is a pipe connection *k* with a three-way cock *s*. To this is connected an exhaust pipe *p* which communicates with a low pressure container *i*. To the three-way cock is connected a connection *o* with an adjustable reducing valve *m* and a pressure gauge *n*. From the reducing valve a supply pipe *l* leads to a high pressure reservoir *g*. Between container *i* and the reservoir *g* is arranged a pump *u*. The three-way cock has a lever arm *f* with a push rod *f'* linked to it. To a control rod *c* which is moved when the speed of the machine is changed is attached a cam *e* with a lateral groove. The push rod *f'* has at its end a roller which runs in the groove of the cam. The degree of reduction of the wringing pressure can be adjusted by the reducing valve *m*.

781,517 Anti-Felting Treatment for Wool Materials

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Treatment of materials made wholly or partially of wool to render them resistant to felting and shrinkage. The method comprises treating the materials with dry chlorine until from 0·2 to 1·5% by weight of chlorine calculated on the weight of wool in the goods is combined with the wool. The chlorine-treated goods are then impregnated with 1·0 to 3·5% by weight of the goods of a melamine-formaldehyde condensation product, and are given a drying or finishing treatment to cure the resin.

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THE Proprietors of Patent No. 727367 for "Improvements in or relating to Looms" desire to secure commercial exploitation by Licence or otherwise in the United Kingdom. Replies to Haseltine Lake and Co., 28 Southampton Buildings, Chancery Lane, London, W.C.2.

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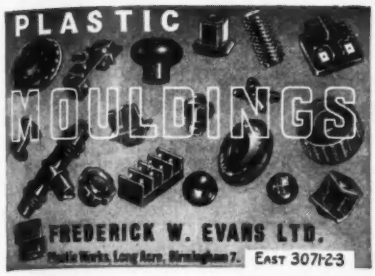

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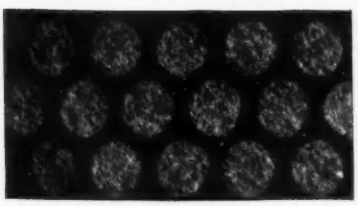

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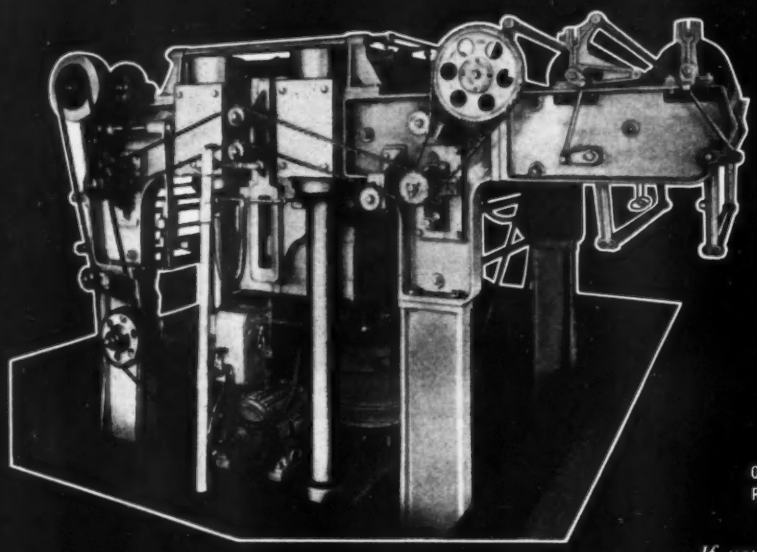

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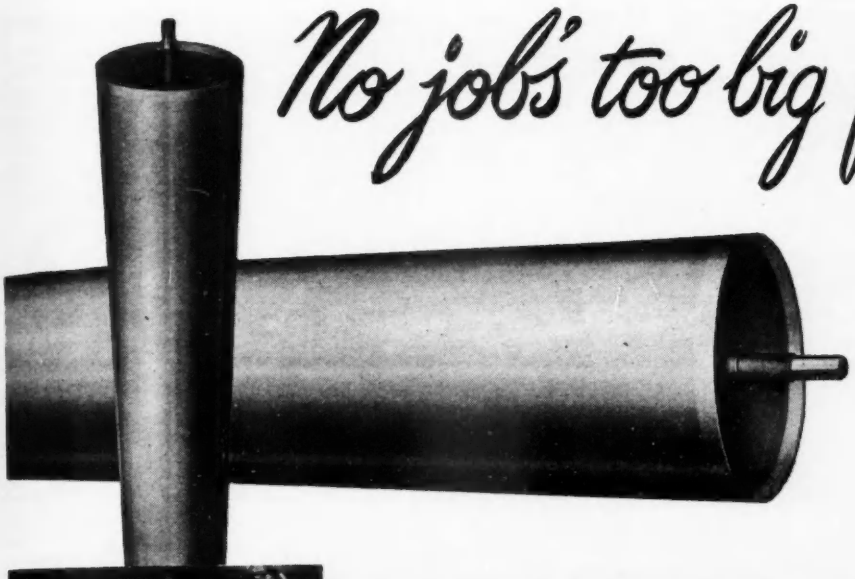

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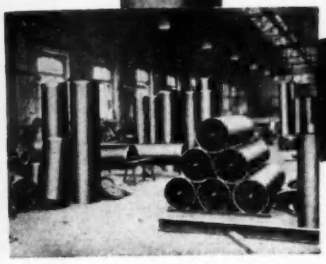

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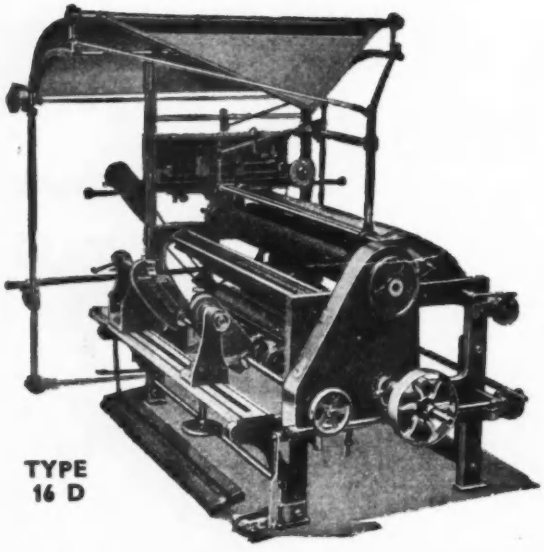

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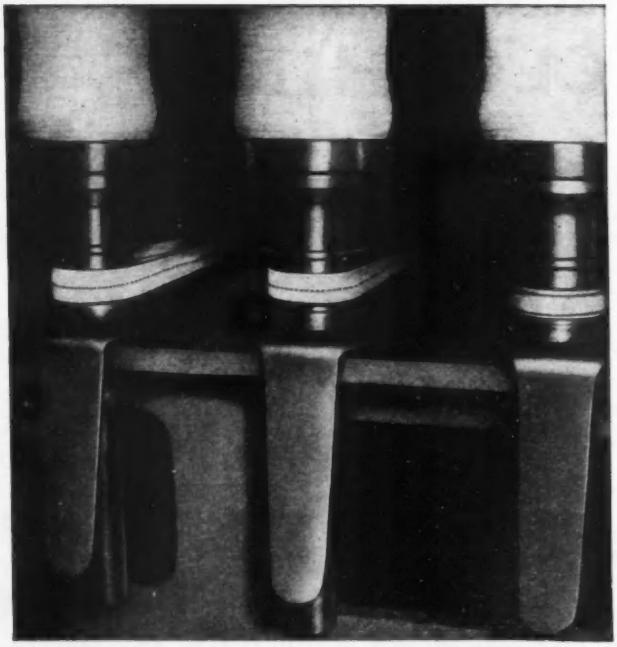

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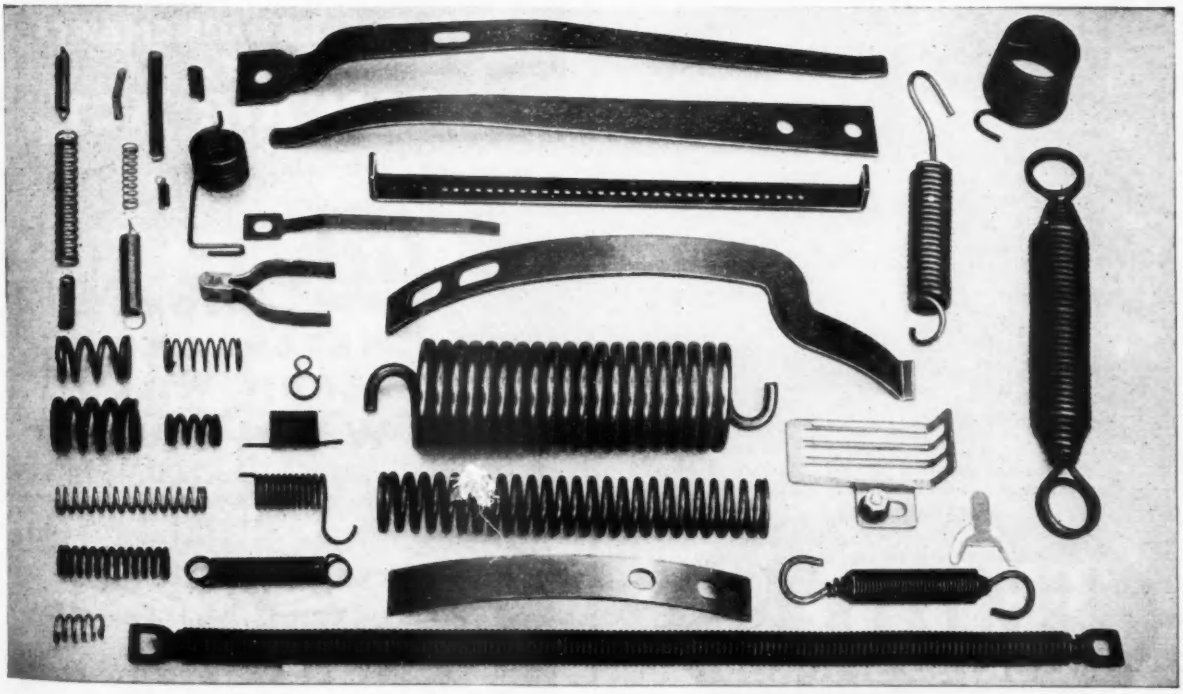

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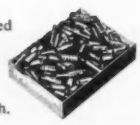

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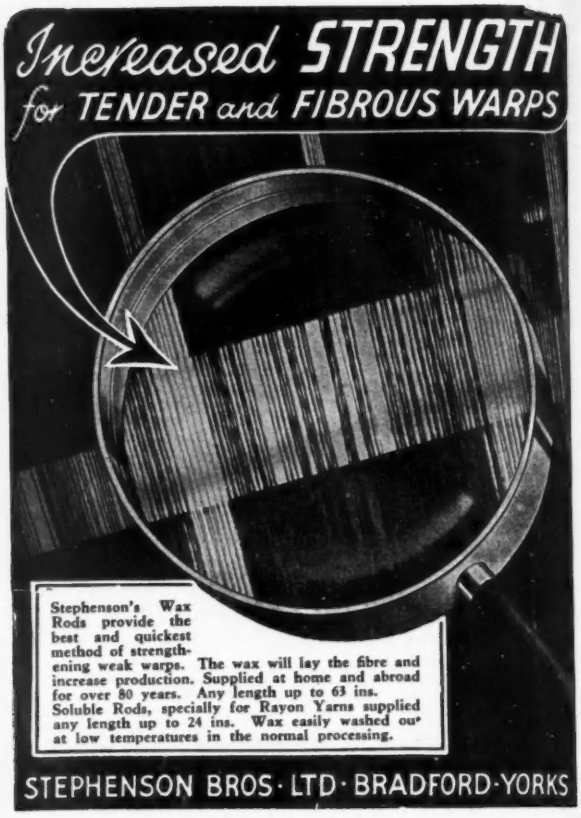
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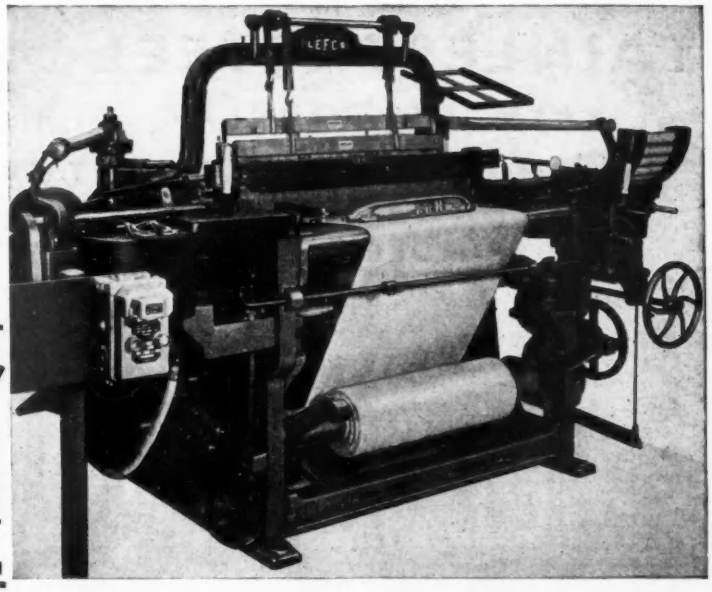

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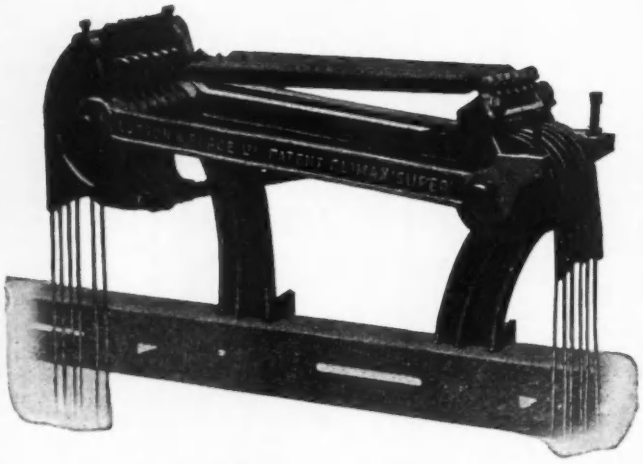

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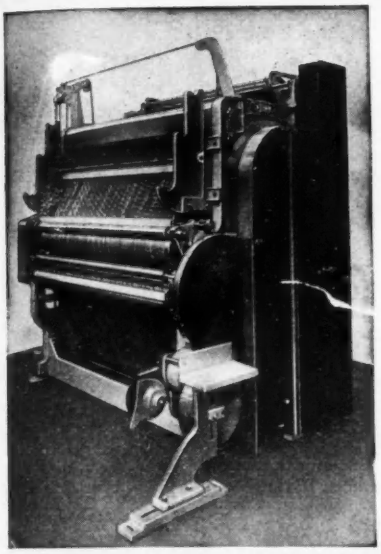

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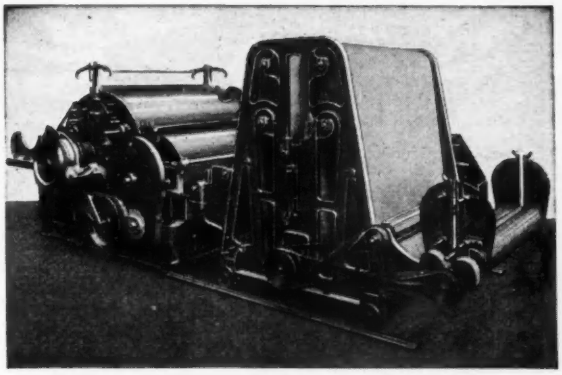

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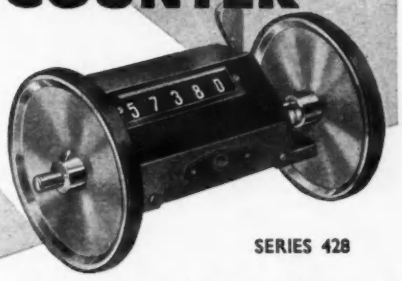

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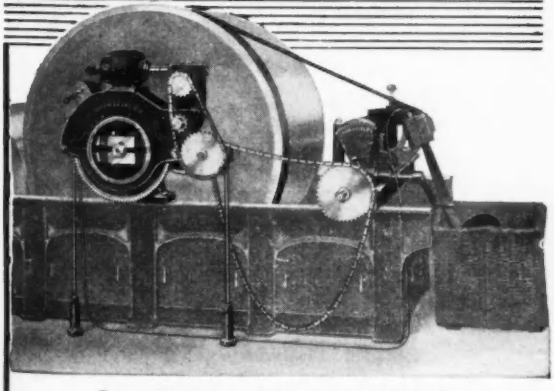

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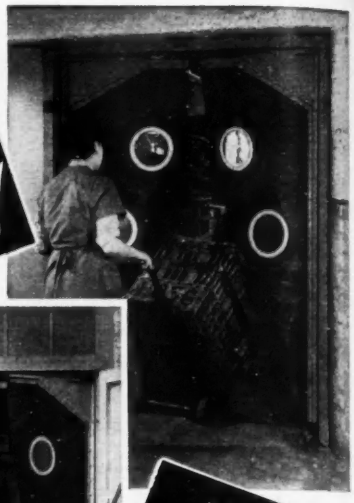

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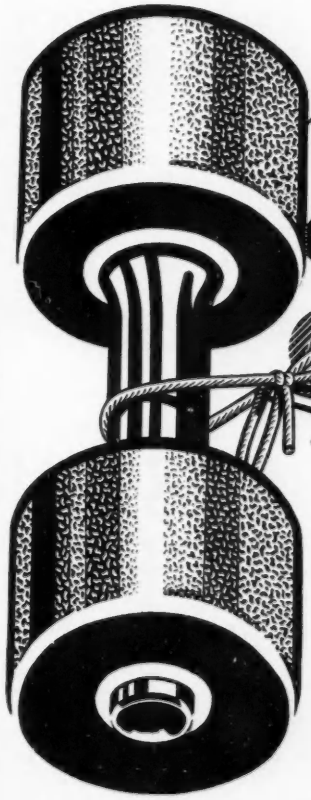

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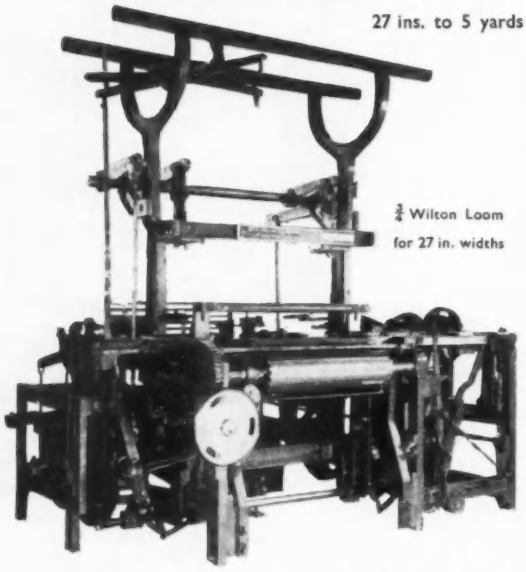

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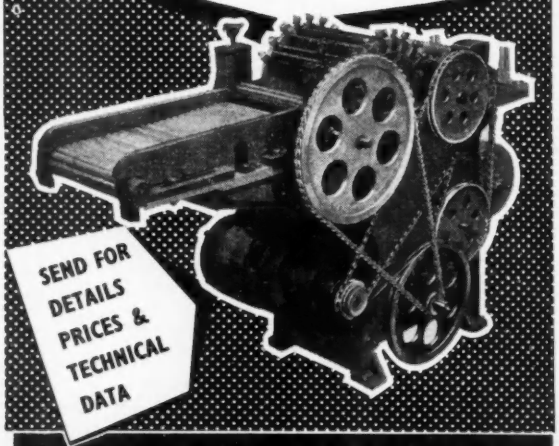

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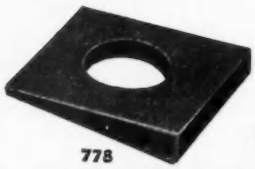

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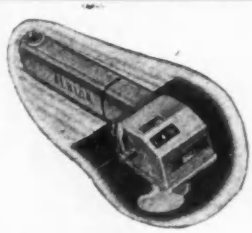

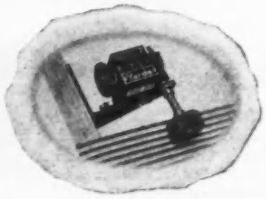

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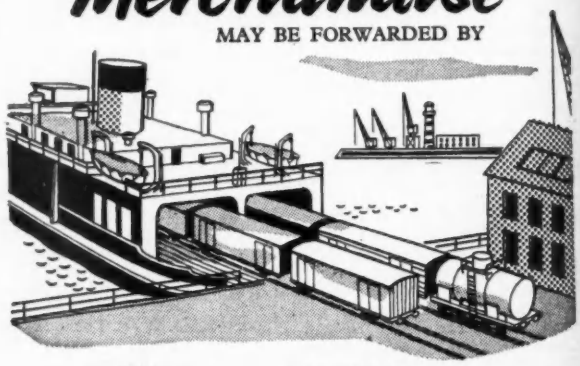

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